system was augmented by the money bazaars. These money bazaars played an important role in Afghanistan's trade.

There has never been an active monetary policy by the Afghan government to direct the economy in most part due to the lack of reliable statistical information. Like most developing countries, there is an official rate and a market exchange rate for Afghan currency. There has been a growing gap between these two rates since the communist takeover and subsequent Soviet invasion. Most external transactions specifically in the private sector are taking place at the market rate in the money bazaars.

E. Prices:

The price of some commodities such as cotton and natural gas has always been controlled by the government. Some other commodities such as sugar, wheat, and cooking oil have been sold by the private sector but procured by the government to maintain its free market supplies.

Afghanistan was suffering from a markedly higher rate of inflation by 1985. Prices for most commodities more than doubled between 1979 and 1983. Food prices rose by over 500 percent between 1979 to 1984 (Nyrop, 1986). The cost of moving goods between Kabul and Mazar-e-Sharif rose by 600 percent. The growth of money supply was 17 to 18 percent annually in large part due to government borrowing to finance the war (Nyrop, 1986). This had increased the money in circulation from 26 million to nearly 50 million Afghanis, resulting in severe inflationary pressures and price increases. The production in the agriculture sector declined drastically. The export of natural gas increased but sold well below the international market prices, and a high percentage of other export goods was refused at the former Soviet Union border during the war (GRA, 1992).

Industry:

Despite the abundant mineral resources, industrial activities were minimal, contributing less than 10 percent to the GDP before the war (Kurian, 1978). Coal, natural gas, textiles, carpet-making, and cement production were among the main industrial activities. The manufacturing sector hired only a fraction of the population who were not involved in agriculture. The major manufacturing activities were the processing of domestic raw materials. The major products included ginned cotton, cotton textiles, sugar, vegetable oils, shoes, cement and chemical fertilizers. There were plans in place for extensive industrialization during the years just before the war.

Minerals:

The limited studies and research in the field of geology and exploitation of underground resources indicate that the mineral resources in Afghanistan are abundant. With few exceptions, most of the underground resources have remained untouched. These raw material and energy sources are a key factor in economic development and

industrialization of Afghanistan. The following is a brief description of underground resources that were reported by the government and independent sources (GRA, 1992; Akbar, 1990).

Asbestos:
Asbestos is found in Logar, Qalat, Khugiani of Nangarhar, Jaghori, Kandahar, and Ghazni.

Berite:
It's quantity has been estimated well over 1.5 million metric tons. The mine in Faranjil of Ghorband contains over 200,000 tons of berite. The berite purity in this deposit is between 66 and 96 percent. The berite of Faranjil has been taken to the former Soviet Union and also used in the drilling for natural gas and petroleum in northern Afghanistan.

Beryllium:
Beryllium is found in Pagmatic rocks. It is three times lighter and twice as hard as aluminum. It is therefore widely used in airplanes and rockets. Large mines of Beryllium are located in Chapa Dara of Pech in Kunar (about 100,000 tons) and Darae Noor in Nangarhar.

Chromium:
So far chromium has been found only in the high alkaline region of Logar. This region is estimated to contain 180,000 tons with up to 42 percent chromium. Inferred reserves are almost 500,000 tons.

Coal:
Coal deposits of Afghanistan are vast and hardly exploited. It has been estimated that proven reserves of high grade coal are about 100 million tons with another 400 million tons in the "probable" category. Most of these deposits are found across northern Afghanistan from Herat to Badakshan in nine major and 36 minor deposits.

Copper:
Research has shown its availability in Ainak, Darband, Jauhar, Taghar of Logar, Khurd Kabul, Chakari, Kamari, Mosie, Chilstoon, Afshar and Khairkhana of Kabul, Maidan, Panjshir, Arghandab, Urozgan, Moqur, Herat, Farah, Zabul, Nangarhar, Ghorband and other places. Among all of these only the Ainak mine has attracted much attention. Ainak is located 35 Km to the south-west of Kabul in Logar province. The quantity of copper ore of this mine is estimated at twelve million tons. The average concentration of copper is one percent and its excavation is considered economical. Considering the size and copper content, the deposits appear to be the largest in the world.

Fluorite:
There is a large mine of fluorite in Tireenkot of Uruzgan province.

Iron:
The largest iron mine is in Hajigak located 61 km to the south-east of Bamyan. This deposit is on the open ground in the form of a hill and it is easy to extract. It is one of the world largest iron findings (the third largest known iron-ore deposit in the world) that is estimated in the neighborhood of two billion metric tons of about 67 percent pure iron. There are iron mines in other parts of the country such as the western range of the Paghman mountains, Kohi-Ghar of Jabal Seraj mountains, Deh Sabz, the Khawak Pass, Rukha Panjshir, Chakari, Kamari, Maidan, Surkhkotal of Herat, Siah Tapa of Behsod, Torghar, Gulistan of Farah, Baharak of Badakhshan, Laghman, Bamyan, and Khakraiz of Kandahar. Some of these mines are economically viable.

Lead, Zinc, Mercury, Collyrium, Cobalt, Molybdenum, Nickel, Tin:
The availability of these materials in good quality is limited and therefore are not considered as a major economical resource yet. There are lead and zinc mines in Tolak, Ghorband, and Faranjil. Collyrium mines are located in Arghandab, Ghorband, Yakawlong, and Aibak.

Manganese and Mica:
There are small reserves of manganese in Kohdaman of Kabul province and in Achin of Nangrahar province. Famous mica mines are in Chachaghan of Nijrab, Maidan, Laghman, Konar and in the pagmite layers of Nooristan.

Natural Gas:
Natural gas deposits were discovered in 1963 in Shibarghan province with reserves estimated to be approximately 500 trillion cubic feet. A one hundred km pipeline carrying Afghanistan's natural gas to the former Soviet Central Asia was completed in 1967. A subsidiary pipeline feeds a 36,000 kW thermal power plant and a 105,000 ton per year urea fertilizer plant in Dehdadi District near Mazar-i-Sharif. These plants use almost 220 million cubic meters of natural gas per year.

In May 1979 there was a major discovery of another gas bearing zone in northern Afghanistan, which has been estimated to be capable of producing 250,000 cubic meters per day. There is further potential for discovery of natural gas at the southern edge of the Kopet Dagh which is near the Baku fields in the former Soviet Union (GRA, 1992).

Oil:
Oil was discovered in the Angot Hills of Saripul after World War II, followed by a discovery in 1975 at At-Darya and in 1976 at Qashquari. Reserves are estimated at 12 million tons or 70.6 billion cubic meters. Further strikes were made in the Saripul-Shibarghan area. The geological history of Afghanistan indicates the presence of five major sedimentary basins. There is a potential of striking oil in the south east end of the main Kopet Dagh basin. The proven reserves of oil as reported in 1977 were about ten to15 million tons. Other potential oil reserves are in Paktia province.

Precious Stones and Metals:
Gem quality emerald, ruby, lapis-lazuli, kunzite, tourmaline, aquamarine, serpentine and garnet are known to exist in Afghanistan. It is reported that only emerald and lapis-lazuli are being exploited.

Gold is found in Zarkashan, Samti, and Nooraba. The total quantitiy of gold has been estimated to be about 30 metric tons. The evidence shows that gold has been extracted from Zarkashan for centuries. People have found gold in the Kokcha river by the filtering method. The most important mineral of silver is Argentite which is found in Badakhshan, Ghorband, Panjshir and Hazarajat but it has little economical value for the nation. Small amounts of platinum can be found in the ultrabozic masses of Logar province and Mahipar of Kabul province.

Uranium:
The Soviet engineers conducted aerial geo-physical surveys of Afghanistan in mid-seventies. The reports showed that Khanshin volcanic complex on the lower Helmand contains large deposits of rich uranium. There have also been signs of radioactive materials in Khair Khana mountains just outside the city of Kabul, but it is not economically viable.

Talc:
There are two talc mines in Afghanistan that have been fully exploited. One is in Achin of Shinwar and the other in Khugiani, both in Nangrahar province. The talc of Achin is of the highest quality and its quantity has been estimated around 700,000 tons. The Mamakhil of Khugiani mine is located on the surface of the ground while the Achin Talc mine is deep under the ground. The Talc of both mines are of the highest quality. The Hoechst Medicine Factory used to get talc from these mines. Some was exported in 1976.

Tin
Tin is found in the high mountains of Badakhshan, in Sofian, Shbirgaran and also in the frozen layers of Shamakat which does not actually have any economical significance so far.

Sodium Chloride (salt):
The important salt deposits are located in Taqchakhana and Kalafgan of Takhar. These deposites are estimated at 130 million tons. There are sources of concentrated salt in Andkhoy, Herat, Helmand, Nimroz, and Kandahar areas.

Others:
There are also mines of natural detergents, and constructional materials such as marble, lime stones, calcium hydroxide, sand, and gravel. There are about 22 kinds of marble found in different colors, of which green Rukham stones are the most usable and popular. Marble is found in Almar, Wardak, Farah, Maidan and other places. The demand of Kabul for marble is usually met by the Tarakhil, Dehsabz, and Hazarabaghal marble resources.

PART II

THE ENVIRONMENT AND ITS STATUS

Land Resources:

A. Agriculture:
The arable land area according to the FAO's estimate is approximately 7.6 million hectares or 12 percent of the land (Majrooh, 1986). Another report estimated the arable land area at 22 percent of the land (Krieger, 1986), but the FAO's estimate is more frequently cited in literature. Afghanistan was an agricultural country and often self-sufficient in food production before the war. Over 80 percent of the population were dependent on agriculture for their livelihood, and at least 67 percent of the labor force were involved in agriculture (Kurian, 1978). The agricultural practices relied on traditional, non-mechanized sources of power, mainly limited to man and animal power. Wheat was the major crop in almost all parts of the country.



The panoramic and productive valley of Logar enjoys the abundance of water, thanks for the Logar river.

Other crops of importance were corn, rice, cotton, sugar beets, vegetables and fruits. Surface irrigation was very common and well-suited to small scale farming. Rivers are the

most important sources of water for irrigation. Other important sources include streams, canals, springs and elaborate underground irrigation systems found in many areas called Karaizes. The Karaiz system was developed centuries ago. It consists of a series of deep holes approximately 60 feet apart starting from the base of a hillside and going towards a lower elevation. The holes were connected through an underground channel with water flowing on the surface from the lower end of the channel.

Despite the insufficient amount of precipitation, dry farming is also practiced, especially for wheat and barley production. Agricultural productivity was relatively low (1.9 tons/hectare) primarily due to poor seed quality, the scarcity of water, inadequate availability of fertilizer and other agrochemicals, poor agricultural practices, and lack of machinery (Samin, 1989).

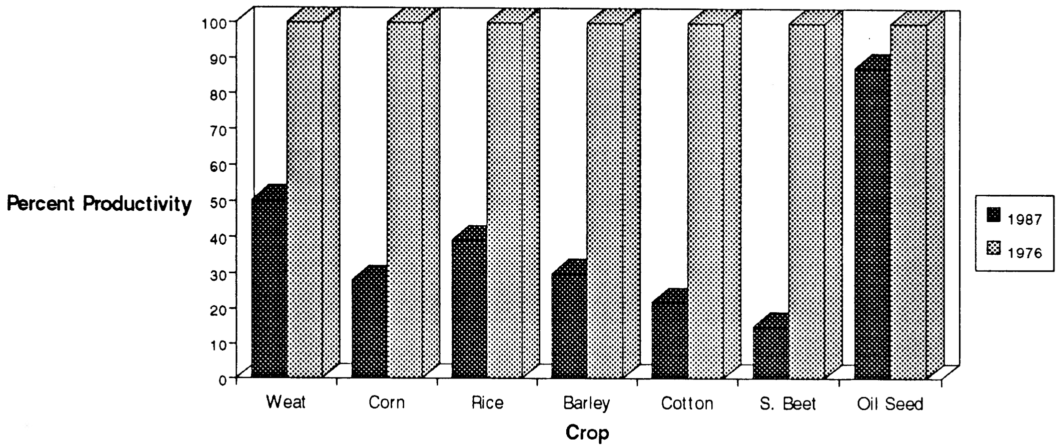
Livestock production was a major sector of the economy. There were an estimated 18.2 million ordinary sheep and goats, 6.5 million karakul sheep, 3.6 million cattle, and 2.1 million camels, horses and donkeys in 1968 (Yusufi, 1988). Karakul skins and wool contributed to the local and national economy. The number of sheep was higher than other livestock mainly because sheep are more drought-tolerant than goats and cattle. Goats are the most flexible in terms of terrain use, being better able to forage on vegetation common to many areas.

The war destroyed the whole agricultural infrastructure, adversely affecting almost all factors of production. Many vineyards, orchards, as well as ornamental trees were cut down by the communist government and the Soviet forces for security reasons. The cutting of vegetation in the northern Kabul area (Shamali) and in the adjacent Parwan province is a perfect example of deliberate environmental destruction. Another example of deliberate destruction during the war was the destruction of a vital part of the agricultural economy, the irrigation system. The former Soviets systematically destroyed the ancient irrigation systems in Afghanistan early in the war to disable the economy (Skogland, 1988). Improved seeds, fertilizer, machinery, agrochemicals, and extension services became unavailable during the war. Lack of security in the villages forced the farmers to migrate to the cities or out of the country. The deposed communist government admitted that 43,000 hectares of fruit orchards have been destroyed, three million units of farm implements were lost, and 3,000 irrigation systems were destroyed as a result of this war (GRA, 1992). The same source estimated the number of land-mines in the country in the neighborhood of ten million units and very possibly the majority in the cropland and rangeland. The destruction from these land-mines will be in addition to the destruction which occurred during fourteen years of indiscriminate air and ground bombings. The same report estimated the loss of sheep and goats during the war at 9.5 million head. Overall agricultural productivity dropped to 30 percent of the 1978 level (Yusufi, 1988). The loss of productive land through soil erosion has been a major problem over the years. Erosion of fertile top soil has resulted in badly degraded agricultural land. Heavy boulders are also washed down hillsides blocking and damaging productive areas.

Despite the lack of a stable central government at the present time, there are signs of revitalization of agriculture in some parts of the country. This could be due to the localized, independent, and primitive nature of agriculture in the country and efforts of non-government organizations supporting agriculture.

Figure 2

Agricultural Productivity in 1987 Versus 1976*



* - Adopted from Samin, 1989

B. Rangelands:

The rangeland area according to the FAO's estimate in 1981 was 54.7 million hectares or 84 percent of the land (MacPherson and Fernando, 1991). This might be an overestimate. Regardless of the size, there has never been a national policy regarding rangeland utilization and livestock management in the country. However, According to Skogland (1988), Afghanistan had a much more favorable ratio of stocking density before the war, indicating that the maintenance of pastures was fairly adjusted to the ecological conditions. The ecological stability domain for regions with ten to 15 cm annual rainfall is between 0.12-0.7 sheep equivalents/hectare of pastoral land with an economic maximum of between 0.2-0.5.

Skogland (1988) reported total overgrazing around all the main centers of farming during the war, causing topsoil erosion and eventual drastic reduction of plant production around such settlements. Because of reduced fertility, the chance for the recovery of the plant cover was minute. The report noted that the vegetation was in better shape with the

topsoil more intact only within the remote regions of pasture land, but with indications that progressive brush and wood cutting for fire has caused soil erosion in these areas also.

With fourteen years of bombing, millions of mines scattered with little or no knowledge of their whereabouts, and continued fuel shortage, it would be too hasty to draw an optimistic conclusion at this time. Scientific surveys of these areas are necessary to estimate the damage to this vital economic and environmental resource.



Without a comprehensive rangeland management, the increased livestock production to offset food shortage could place a burden on the rangeland.

C. Forests:

Based on the FAO and UNDP figures, the forests of Afghanistan covered 2.2 million hectares or 3.4 percent of the land during early 1980s (UNDP, 1993a). Other reports put this figure at two million hectares (Kurian, 1978). This valuable environmental resource is limited compared to that in other countries in the region such as Pakistan, Nepal, and India where approximately 5 to 22 percent of their land area is covered with natural woody vegetation (Rao, 1989). The Paktia, Kunar and Nooristan areas are the home for the natural forests that are mainly consisted of species such as oak, cedar, ash, willow, pine and spruce. The natural nut bearing forests (mostly pistachios) are scattered in the northern and central provinces mainly in Badghis and Samangan. The total size of the nut forests was estimated at 300,000 hectares before the war (Amin and Schilz, 1976). These

forests produce high quality edible pistachios and other nuts, providing an income for the surrounding villagers.

There are historical references to the large forests existed in Panjsher valley prior to the thirteenth century until the trees were cut down and burned to smelt silver, copper, and other ores (Dupree, 1980). There are no forests in Panjsher Valley now.



A view of the disappearing forests.

1. The Paktia Forests:
The thick forests of oak and poplar trees of Paktia were once unique in the area. They extended from Setokandaw to Zadran and from Khust to Chamkani and Zazay. The Paktia project was set up towards the end of 1960 in close cooperation with the government of the Federal Republic of Germany to protect these forests. One of the major aims of the project was the introduction of citrus fruits and the cultivation of vegetables that were unknown to the region. The process of degradation and deforestation has been more widespread in this area than any other place in Afghanistan. Numerous bombings during the war caused major and long lasting wild fires. Trees have been cut extensively for fuel or sold as lumber in the neighboring country, Pakistan. Some parts of the forest has already disappeared. Even the mountain tops are now naked. Top soil erosion is clearly visible in deforested areas. If serious measures are not taken immediately to stop the deforestation, this forest will only be a memory (Jalal, 1989).

2. The Kunar and Nooristan Forests:

Green trees covered the top and slopes of the mountains of Kunar and Nooristan. Most parts of the forests in these regions were untouched before the war. When this region was officially proclaimed as a national park, the Wildlife Protection Organization of the United Nations expressed keen interest, and some experts began practical work in Kunar province. Simultaneously, the Carpentry and Timber Factory of Kunar also started its production and research work. This factory was part of a large project in Kunar which was responsible for building a hydropower station, reforestation, forest protection, development of agriculture such as tea plantation, and livestock husbandry (Jalal, 1989). There were a number of major fires during the war as the result of air bombings of Kunar valley. Indiscriminate cutting of these forests, particularly the Kunar forests, has occurred during the war. Truck-loads of timber were taken daily to the lumber markets across the border in Pakistan. In 1990, an estimated 50 truck-loads of timber were leaving the Kunar valley daily just from one road (Esmail and Zurmati, 1991). The deforestation of Kunar reached its peak in recent years, causing obvious bare mountain tops.



The current speed of deforestation suggests a total loss within a few decades.

3. The Nut Forests:

Prior to the war, the government maintained the pistachio and other nut forests during the growing season and allowed the villagers to harvest for themselves at the end of the season. As the war began, the existing surveillance eroded. The forests became vulnerable to misuse. The trees were cut for heating and cooking due to fuel shortages. The wood

PART I

GENERAL INTRODUCTION

Geography:

Afghanistan is an entirely landlocked country that is located in the center of Asia. It borders with Tajikistan, Uzbekistan, and Turkmenistan in the north, Iran in the west, Pakistan in the south and east, and China on the tip of the far north-east. Kabul is the nation's capital. Kandahar, Herat, Mazar-e-sharif, Jalalabad, and Kunduz are the major cities. The land area is approximately 650,000 square kilometers (km) mostly consisting of highland plains and plateaus, separated by mountain ranges. Approximately 49 percent of the total land area is over 2,000 meters elevation (Krieger, 1986). The main mountain chains run from the Pamir knot in the northeast towards the center of the country and then split into two branches, one running westwards towards Herat and another running southwest, decreasing in height until it recedes into the Helmand basin. High mountain areas such as Pamir are mostly above 3,000 meters with individual peaks up to 7,620 meters, and persistent snow cover above 5,000 meters. Wakhan, Badakshan and Nooristan areas are located at slightly lower elevations and form a link between Pamir and the Central Mountains. The winter temperature is mostly well below freezing and the summer daytime temperature can reach 26 ^{O}C in these areas. The soil is mostly thin, the richer alluvial material supporting good pasture or crops in lower valleys. The Central Mountain areas are located at approximately 2,700 meters with peaks reaching 4,270 meters. The Central Mountains provide for three rivers, Kabul, Helmand-Arghandab, and Hari Rud. The desert areas of west and southwest such as Seistan Basin are located at approximately 400 meters elevation and are very hot.

Climate:

The country did not have a network of meteorological stations until 1939, and even after 1939, there were a few meteorology stations relative to the size of the country (Bowlby, 1978). But the general aridity of the country as a whole is known. There is a marked difference between the day and night temperatures and the seasons are distinct. With few exceptions, mean annual precipitation does not exceeds 40 cm. Rainfall increases from west to east. The south and west regions are mostly deserts. The central and northern areas have steppes and dry woodlands. Coniferous forests are limited to the humid mountains along the Pakistani border in the southeast. The southwestern corner is true desert. Lowlands fringing the mountains are semi-desert with 20 to 30 cm annual precipitation and scanty vegetation except along the rivers. Rivers originate from mountains which enjoy slightly higher precipitation than the rest of the country. The Amu river irrigates some parts of the northern plains where naturally possible. The northern plains provide the main agricultural lands. The Hari Rud, Farah Rud, Khash Rud and Helmand rivers irrigate the western and southern lowlands, and the Kabul river and its

from the valuable pistachio forests has even appeared in the fuel markets in Kabul during the war (GRA, 1992). The extent of the damage to these forests has not been fully assessed.

The damage to the forests may be the greatest environmental disaster which occurred in Afghanistan during the war. The forest area has declined from 3.4 percent during early 1980s to 2.6 percent of the land by the beginning of 1990s (UNOCA, 1991). It is even more unfortunate that the destruction of these forests still continues. With the return of refugees , there is now an increasing demand for timber for the construction of new housing and reconstruction of those destroyed during the war. The deforestation process has reached the stage where a total loss may be imminent unless urgent and decisive measures are taken to protect the remaining natural forests.

D. Major Wetlands and Wildlife Habitats:

1. Pamir Region:

This upland mountainous region is located in Badakhshan province in the far most north-eastern corner of Afghanistan. The region is composed largely of rocky mountains and scattered grass rangelands. This area is one of the most spectacular landscapes of central Asia, providing habitat for the famous Marco Polo sheep <u>Ovis ammon poli</u> and several other mammals and birds.

2. Band-e-Amir:

Band-e-Amir is one of the most beautiful landscapes in Afghanistan, located in the Band-e-Amir Valley in central part of Afghanistan. It consists of six dark blue lakes approximately 60 meters deep, lying one after another. It was a popular tourist attraction before the war.

3. Kole Hashmat Khan Waterfowl:

Kole Hashmat Khan was once a magnificent lake below the Shuhada-i-Salehin cemetery in the city of Kabul. It was a waterfowl reserve and a royal hunting resort for the former king. The lake lies in the Hindu Kush flyway and was a major resting ground for birds migrating from the south to the north. There were over 30,000 migratory birds using this area with 157 species being identified before the beginning of the war in 1978 (GRA, 1992).

The lake was badly degraded during the war by the human use of water for irrigation and livestock and the random building of mud houses by internal refugees from the countryside. Kole Hashmat Khan dried out in late 1980s, but occasionally becomes a lagoon during the periods of heavy rainfall and flooding (Jalal, 1989).

4. Ghazni Marsh Land:

Ab-i-Estada-i-Ghazni (Ghazni Marsh Land) is located in Ghazni province in the southeastern part of Afghanistan. This internationally important wetland occupies an area

of approximately 120 sq. km. During the summer, it gives shelter to migrating birds on their way to the warm and wet groves and tropical areas of Africa and India. It is estimated that 250 species of birds come to the region, where some also spend their oviposition period. Duck, pelicans, gull, crane, flamingo and the Siberian crane are a few of the more significant birds of Ab-i-Estada-i-Ghazni.

The Siberian crane is an endangered species internationally. According to an estimate made by the Faculty of Natural Sciences of Kabul University, there were only 70 of these birds in Ab-i-Estada-i-Ghazni in 1970 (Jalal, 1989). Only 17 Siberian cranes were accounted for by 1990 (McPherson and Fernando, 1991).

The diverting of water by the hydropower dam of Sardeh has decreased water levels and increased salinity in this region. In addition, indiscriminate hunting, egg retrieval, and frequent disturbance by humans and livestock as well as ravage from the war have threatened this marsh land and its wildlife. Immediate attention and rehabilitation is required to preserve this wetland and its wildlife.



Ab-i-Estada-i-Ghazni has international importance for providing a nesting place for many avian species including some endangered migratory birds.

5. Dashte-Nawar Waterfowl:
Also located in Ghazni province, Dashte-Nawar, along with Ab-i-Estada, is an important breeding and feeding site for migratory birds.

6. Darqad:
Darqad is located on the edge of the Amu river in the neighborhood of Hazarat-i-Imam district of Kunduz province. It consists of extensive reed-beds, green groves and woods. This area is famous for its wildlife. It was declared as a royal hunting ground in northern Afghanistan.

7. Ajer Valley:
Ajer Valley is located in the remote Hindu Kush highlands in the central part of Afghanistan. This green and fertile valley had been a royal hunting reserve since the turn of the century and populated with ibex Capra ibex, Bactrian deer Cervus elephus bactrainus, feral yak Bos grunniens(E), snow leopard Panthera uncia(E), leopard P.pardus(V), lynx Lynx lynx, wolf Canis lupus(V), jackal C. aureus, fox Vulpes vulpes, otter Lutra lutra, marten Martes foina, long tailed marmot Marmota candata, buffaloes, and at least 60 species of birds. A number of reindeer and buffalo were brought from the northern parts of the country into this valley in order to be protected and to breed.

Despite being an isolated area, the natural resources of Ajer Valley were not spared from the devastation of the war. The senseless pleasure hunting of the deposed communist government and its supporters caused extensive damage to the environment of this region (Jalal, 1989).

8. Hamoon-e-Helmand:
Hamoon-e-Helmand consists of a number of lagoons in a dry sandy desert formed from the waters of the Helmand river and its tributaries reaching the south western edge of Afghanistan. Many species of birds come down to the lagoon for rest on their migratory pathway. Flamingo and the Siberian crane are the two rare birds that can be found in Hamoon-e-Helmand during the summer. This wetland is believed to have been the least affected by the war.

9. Lake Shewa:
Lake Shewa is the largest lake in Badakhshan province and used to be a nomads' summer gathering spot (Dupree, 1980).

Most of the wildlife habitats and wetlands of Afghanistan have suffered from the long-lasting war to various extent. Of the wetlands and wildlife habitats described above, Kole Hashmat Khan located in the city of Kabul is believed to have been the most severely damaged during the war, followed by Band-e-Amir with its high density of human settlement. Environmental values may be the least affected in the Pamir and Hamoon-e-Helmand areas due to their relative remoteness (Jalal, 1989; McPherson and Fernando, 1991; GRA, 1992). However, one cannot be sure until field visits are made and ecological surveys are performed at all of these sites. It is encouraging to know that the staff of the FAO in Islamabad, Pakistan and the International Convention on Wetlands and Waterfowl have expressed interest in assessing the environmental damage to Ab-i-Estada and Dashte-Nawar wetlands when the security returns (McPherson and Fernando, 1991).

E. Major Recreational Parks:

There are also several major recreational parks in Afghanistan such as the Paghman Canyon, Estalif Hills, Qargha Dam, Gul Baag, and Takht-e-Safar in Herat to name a few. The war damage to most of these parks is extensive. The Paghman Canyon (17 Km west of Kabul City), once gorgeous foothills and a summer paradise for the monarchs and thousands of vacationers, was the battle field for countless offensives during the war. The environmental damage to these parks will require a full assessment.

Water Resources:

The rivers are the main source of water. There are several major rivers in Afghanistan. The Amu river runs along the 1250 km boundary with the northern neighboring countries before turning north and flowing into the sea of Aral. It originates in the Pamir area as Ab-e-Wakhan. The name changes to Ab-e-Panja when joined by Ab-e-Pamir and then to Amu when joined by Kokcha, one of it's primary tributaries. The Kokcha river runs 320 km first northerly and then westerly before flowing into Amu.



The Logar river.

The Anjuman, Munjan, and Warduj rivers are tributaries to Kokcha. The Kunduz river is another major river in northern Afghanistan that runs 480 km before flowing into Amu river. The Kunduz river runs from south to north. The Kunduz river develops as the Surkhab river (which runs west to east) meets the Andarab river (which runs east to west).

The Surkhab river is a collection of waters from the Kamard, Saighan, and Bamyian rivers. The Kunduz river is joined by the Khanabad river later before flowing into the Amu. The Helmand river originates in the Baba mountains near Kabul, runs 1,126 km south-westerly and is joined by the Kaj Rud, Tirin, and Musa Qala rivers before joining the Arghandab river system and flowing into the Hamun-e-Helmand lake bordering Iran. The Kabul river runs 611 km until it joins the Indus river in Attock. The Kunar, Panjshar, and Logar rivers are tributaries to the Kabul river. Hari Rud, Farah Rud, and Khash Rud are also among the major rivers. Most of the river flow occurs during spring and early summer. Canals and streams are built to elevate water to the land across the rivers for irrigation. Another source of running water is the springs that are used for irrigation and domestic uses. Water from the rain during the rainy season is used to grow non-irrigated (Lalmi) crops such as wheat in some areas. Karaizes (underground water canals) are also used for both domestic and agricultural purposes. Karaizes are built underground from higher elevations towards the lower elevations until reaching the surface.

Several dams of various sizes are built on the main rivers for water storage and power production. The Kajaki, Arghandab (Dahla), and Naghlu are the largest water storage dams in Afghanistan (Keshawarz, 1991). Kajaki is built on the Helmand river and is the largest dam with one billion eight hundred fifty million cubic meters capacity, capable of irrigating an estimated two million jerib or 400,000 hectares (1 jerib $\approx$ 0.2 hectare) of agricultural land. Arghandab Dam's capacity is 457 million cubic meters and irrigates 28,000 hectares of the 80,000 hectares of Arghandab Valley. The Helmand and Arghandab Valley Development Plans had been included in several five-year national economic plans but still require further improvement in order to become fully operational. In addition to the agricultural irrigation uses, Kajaki and Arghandab dams are also used to generate electrical energy and control floods. The Naghlu dam is built on the Kabul river near Sorubi. It is mainly an electrical power producing dam with no direct irrigation purpose. The Darunta Dam near Jalalabad is not considered a storage dame. It controls the water level in Nangarhar Canal (70 km) for Nangarhar Valley Development Project. It has the capacity to irrigate approximately 13,000 hectares. Other dams in smaller sizes are the Saraj and Sardeh dams in Ghazni, the Ghazi dam in Butkhak, the Kharwar dam in Logar, and the Qargha dam in Kabul (Majrooh, 1986).

Rivers, karaizes, streams, and canals are a vital part of the Afghan agricultural economy and domestic life. Rivers and streams provide nearly 85% of irrigation water with the rest being supplied by springs and karaizes (UNDP, 1993b). These irrigation systems were the subject of systematic destruction during the first years of the Afghan-Soviet war (Skogland, 1988). The destruction continued during the entire length of the war. An estimated 27% to 36% of all irrigation systems were damaged as a result of direct effects of the war (UNDP, 1993c). The damages to the irrigation systems resulting from indirect effects of the war are not included in the above estimate. The reconstruction of these water systems has already began in some areas of the country (ADA, 1993 and 1994). No data are available to describe the post-war status of the rivers and the water dams. A full environmental assessment of these vital resources is indispensable.

Air Resources:

A. Outdoor Air:

No data are available on the levels of various pollutants in the air of major cities in Afghanistan at this time. Air quality in most parts of the country was good before the war, for obvious reasons such as the limited number of industrial establishments and motor vehicles. In some urban areas the air quality has been deteriorating due to excessive dust and exhaust from a growing number of vehicles, and extensive use of coal and wood for heating. Dust is more evident in the air of rural and urban areas and seems as one of the major factors affecting outdoor air quality at present time. Destruction of paved roads, more uncultivated land, and widespread cutting of trees and ground cover could be among the factors contributing to the increased dust problem. The motor-scooters using a mixture of light and heavy fuels were introduced prior to the war as taxis in a few large cities of the country and soon became the major contributor to the air pollution. Unless appropriate steps are taken, the accelerating and indiscriminate use of these vehicles will soon change the air quality of the major cities, particularly Kandahar and Jalalabad, for the worst. Air quality is a major problem in almost all advanced as well as developing countries. Without sound protection measures, the air of major cities in Afghanistan could be as poor as Peshawar, Pakistan in a near future.



Destruction of paved roads, more uncultivated land, and widespread cutting of trees and ground cover could be among the factors contributing to the increased dust problem.

B. Indoor Air:

Humans in urban areas spend much of their time in indoor areas, such as home, work, school, and public or private buildings. The major sources of indoor air pollutants are cooking, smoking, heating, cleaning, chemicals used in the construction of buildings and furniture, natural geological materials, and pollutants forced in from the outside air. In developing countries such as Afghanistan, the smoke generated from cooking and heating is the primary indoor air pollutant, affecting the health of residents, particularly women and children. Many carcinogenic compounds have been found in smoke from residential wood combustion sources (Calle and Zeighami, 1985). The other major indoor air pollutant is the smoke generated from tobacco sources such as cigarette and chilam (a tobacco smoking device that is common in Afghanistan). The effects of smoking are well known and require no further discussion. Second hand smoking (side stream smoke) is believed to have higher levels of organic compounds of lower oxidation state and is an important source of indoor carbon monoxide, nicotine, ammonia, and aldehydes. Nonsmokers exposed to side stream smoke are believed to be at increased risk of impaired childhood lung development and lung cancer (Dudney and Copenhaver, 1985). Children of smoking parents are more likely to develop respiratory disorders than children of nonsmoking parents. Nonsmoker office workers working in smoky offices for several years have similar lung disorders as light smokers. Wives of smoking husbands have 2 to 3 times the risk of lung cancer than wives of nonsmoking husbands (Glantz, 1985). The indoor air quality problems in advanced countries are mainly due to microbial agents, smoking, airborne asbestos, natural radon gas, volatile organic substances generated from chemicals used in the building material and furnishings and material used for cleaning, and pesticides. These sources of indoor air pollution also exist in developing countries but are given less attention because the cost of control outweighs the potential risk. The pollutants from these sources can have deleterious effects on human health. Formaldehyde is used in plywood, particle-board, foamed insulation, paper products, fabrics and cosmetics. Formaldehyde is a known animal carcinogen. Radon is a natural radioactive gas that can rise in the soil and pass through the foundation into living areas. It can also pass into water or natural gas supply system and be transported into a home. Significant exposure to radon can cause lung cancer in man (Dudney and Copenhaver, 1985). A number of illnesses such as infections (Legionnaires' disease), dermatitis, hypersensitivity, mucus membrane irritation, and reproductive system complaints have been associated with buildings in non-industrial settings (Kreiss and Hodgson, 1985). There are no official reports of building-associated illnesses in Afghanistan.

Some of these indoor pollution sources particularly tobacco smoking have become more common in Afghanistan. The noticeable increase in the number of cigarette smokers could be partly due to the stress from the war. With an alarming increase in opium production in the country (an estimated 2,000 metric tons in 1990), drug abuse, particularly opium addiction, has sharply increased among the population, especially among women and youngsters as young as eleven years old (UNOCA, 1991). Other indoor pollution sources may exist or could develop in the future, requiring sound preventive measures. Energy efficient equipment, engineering control, public education, civil laws, and introduction of

economically sound alternative cropping for opium production are the most important factors in reducing indoor pollution and the resulting adverse effects.

Energy Resources:

Production in rural areas, particularly in the agriculture sector, is solely dependent on energy from human, animal, and natural resources. The carpet industry is highly dependent on human energy. In many rural parts of the country shrubs and animal dung are used for fuel. In areas where trees are accessible, trees are used as the main source of fuel. The high rate of tree removal has caused deforestation in these areas, contributing to soil erosion and reduced soil fertility. Coal is extensively used for heating in urban areas and rural areas near coal mines. Electrical power is limited to the major cities. Even the suburbs of the capital city (Kabul) do not have the privilege of having electricity. Kerosene is widely used for lighting in rural areas. Electrical power is derived mainly from hydroelectric power plants built on the rivers. The hydroelectric power plants in the order of capacity are Naghlu, Helmand, Mahiper, Saroobi, Nangarhar, Kajaki, Pule Khumri, Chake Wardak, and Jabal Saraj with a total capacity of 200,000 kW (Majrooh, 1986). Total electric power production according to Nyrop was 840 kW hours in 1978 (Nyrop 1986). Mazar is the only major city with a natural gas power plant. According to the 1978 World Bank Report, half of Afghanistan's hydroelectric power potential would come from the Amu river. The Soviets had never allowed the Afghans to undertake any large-scale irrigation projects using water from Kokcha river or the Amu river. (Nyrop, 1986). Hydraulic power is used in a primitive way in grain mills around the country. The use of wind power is not common. The use of solar energy is at its trial stage. Gasoline is imported and used to operate existing machinery and motor vehicles.

Wildlife:

The species of wildlife in Afghanistan are mostly those adapting to arid plains or mountain conditions. Most of the predators have been hunted for their furs. Predators such as Turanian tiger may have already been extinct. Other species such as the snow leopard, the leopard, wolf, red fox, brown bear, ermine, cheetah, the hyena and lynx, are either in danger of extinction or their population has sharply declined. There are also a number of forest and mountain wildlife such as wild goat (Capra aegagrus), urial (Ovis orientalis), ibex (Capra ibex), markhor (Capra falconeri), Bactrian deer (Cervus elaphus bactrianus), feral yak Bos grunniens(E), otter Lutra lutra, marten Martes foina and long tailed marmot Marmota candata (GRA, 1992). Their population has been reduced by hunting and habitat degradation. It is believed that the wildlife of extremely remote and isolated areas such as Pamir and its rare and famous Marco Polo sheep (Ovis ammon poli) have been spared. Yak is another famous domesticated animal of this region. It is the pack animal of choice for the rough terrain of Pamir.



The war never stopped the fur business. Above is a typical shop from where the fur reaches the elaborate market.

Aquatic avian in Afghanistan are those that migrate seasonally from Siberia to the warmer waters of the Indian sub-continent and Africa. The limited number of the wetlands existing in the country are vital for the thousands of ducks, pelicans, gull, crane, flamingo, the Siberian crane and other waterfowl as their resting places. The Siberian crane Grus leucogeranus, and the greater flamingo Phoenicopterus roseus are among the rare species that use the wetlands in Afghanistan for resting and feeding during their migrations. Many birds also stay over winter in these wetlands. Chukars, pheasants, eagles, falcons, and owls are among the many species of birds found in dry terrain. There are also undocumented allegations of increased eagle hunting in Afghanistan for smuggling their organs to middle-eastern countries as medicine in exchange for hefty cash.

Fish are abundant in many mountain streams, rivers, and reservoirs behind dams. Trout is the predominant species. Laqa is a larger fish (may be related to catfish) found in the Amu river. A modern fish hatchery existed just below the Qargha dam, less than 10 miles west of Kabul. No recent information is available on the status of Qargha fish hatchery.

The management of wildlife before the war was minimal, mainly imposed as declaration of wildlife sanctuaries for royal hunting. This form of protection was somewhat effective for the designated areas against indiscriminate hunting. Overall, with a few exceptions such as hunting Marco Polo sheep, there were no regulations for hunting wildlife or altering their

habitats. The designation of some wetlands as waterfowl sanctuaries by the international organization (World Heritage Convention) during 1979 never materialized due to the war (MacPherson and Fernando, 1991). The increased fire power during the war coupled with the food and fuel shortages and social displacement in a lawless land placed a heavy toll on wildlife and their habitats. Accurate surveys of current wildlife populations and their habitats are essential as a foundation for building a national wildlife protection and management policy.

Hazardous Waste:

A. Municipal Waste:

The overcrowding of urban areas during the war, particularly in Kabul, substantially increased the existing sanitation problems. The population explosion in the cities coupled with the government ignorance of the sanitation problems and breakdown of the old system brought sanitation to its lowest level. Out-houses in the cities were poorly maintained due to diminishing demand and destruction of the agriculture infrastructure. Sewage and refuse were discharged into the streets. Sanitary water became scarce as the urban population increased, increasing the demand while the existing sources of supply were destroyed.

There has never been a comprehensive waste disposal or sewage system in the country (GDRA, 1987). Most urban and rural dwellings were constructed in such a way that human refuse was discharged in out-houses with vaults opening towards the streets and rights-of-way. The accumulated waste was collected by private individuals at their convenience for use as manure for agriculture. These open out-houses were the source of many parasites and house flies and provided a suitable media for their incubation. In fairly modern sections of Kabul, the houses were built in such a way that the waste from a house would flush down to and accumulate in an underground pit. Because of limited access to sanitary water from municipal sources, wells had been dug in most of these houses in close proximity to the pits, leading to well contamination. Other solid wastes were dumped on the open ground, in the rivers, or estuaries. Fluid waste effluent flowed to lower elevations, forming estuaries of raw sewage. Municipal solid waste collection and landfill system were limited and confined only to the most affluent sections of some of the major cities.

B. Industrial Waste:

Heavy industries represent a small portion of the national activities. Small industrial operations such as tanneries, food processing, automotive repairs, carpet, and textiles contribute to the bulk of the industrial activities. There were no environmental codes for solid or toxic waste discharges or any testing available to determine the extent of contamination from these industries. Waste and effluents from all industrial operations were dumped directly into the river systems or discharged onto the open grounds,

tributaries provide valuable irrigation water in the east. Precipitation occurs mostly in winter, often as snow. The water from melting snow in the spring and summer flows in these rivers and causes flooding and erosion at times during the peak runoff season. There are a few areas with higher than average rainfall. Indian monsoons usually reach the valleys on the southeast borders, providing rain at times in the summer. Normal precipitation is not sufficient for agriculture without supplemental irrigation in areas such as Jalalabad, a valley that is climatically similar to the Imperial Valley of California.



Wardak Valley in the late Spring of 1994.

Mean July temperatures for the country as a whole are above 25 °C, with daily maximums well above this. Mean July temperatures are 35 °C in the southwest, and 10 °C or less in high mountains. Winter is cold with mean January temperatures of 6 °C in southwest, 3 °C in northern lowlands, and below freezing in mountains. The wind is generally mild, except in the southwestern areas where wind velocity is severe both in the summer and the winter. The hot and dry wind from northwest in the summer, known as "the wind of 120 days", can reach 177 km per hour from July to September removing loose top soil and shifting the sand in southwest.

The evidence of climatic change suggests no major change in the region since 500 B.C. except small fluctuations in temperature and precipitation (Bowlby, 1978).

contaminating the air, soil, and the water system. It is estimated that the city of Kabul alone discharges approximately 15 km of sewerage mains and 10,000 cubic meters of untreated waste daily into the Kabul river during recent years (GRA, 1992).



The absence of an urban waste disposal and sewage system has brought sanitation to its lowest level in the cities. (Picture: City of Ghazni)

C. Radioactive Waste:

There are also undocumented reports of radioactive waste dumping during the war by the former Soviet Union, reportedly in the southwestern deserts (Bakwa Desert) of the country (AM, 1991). This could be one of the most serious environmental disasters of the Afghan-Soviet war which requires international inquiry and cooperation. These reports must be taken seriously and research must be done to either confirm or deny the allegations. The importance of investigating these allegations and the leading role of international agencies cannot be overemphasized.

Pesticide:

The use of pesticides had not been widespread before the war compared to some other developing countries. However, pesticides have been used indiscriminately in various parts of the country for the last few decades. The efficacy of a pesticide was the only important consideration. Its environmental or health effects were not given much thought. Organochlorines and organophosphates were among the pesticides of choice. DDT has been widely used for plant, livestock, poultry, human, and household pest control.

Malathion and metasystox were used mostly for orchard pest control. The use of less harmful pesticides such as sulfur was common in many vineyards. There has never been an organized pesticide management system, nor are there regulations relating to the import, transport, application, storage, and disposal of pesticides. No testing has been performed to determine their fate in the environment and in the food chain.

The management and handling of pesticides was totally out of control during the war. The former Soviet Union disposed of their stocks of some internationally banned pesticides such as BHC into Afghanistan as agricultural aid. As of 1992 there were approximately seven million kilograms of BHC in paper bags stored improperly in various locations in northern Afghanistan (GRA, 1992). This amount is probably one of the largest stocks of this banned chemical in the world. At the rate of five pounds per jerib it will be adequate to spread over three million jeribs of agricultural land. Shipments of other pesticides in very poor packaging condition from the former Soviet Union into Afghanistan continued until the last years of their occupation.

The return of millions of refugees will cause a tremendous demand for greater agricultural output and thus increased use of pesticides. In addition, the world is becoming more and more conscious about their diet and the international regulations are becoming more stringent about the levels of pesticide residues in products available in the world market. Pesticides could become one of the most important issues in a near future in Afghanistan.

Noise:

This invisible pollutant can cause hearing loss, tension, and abnormal blood pressure. Motor vehicles, trains, rail roads, airports, factories, machinery are the normal sources of noise. Developing countries have given less consideration to this already existing component of the environmental pollution. One stop at any major city in a developing country would adequately substantiate this argument. The number and volume of the noise sources were growing in the major cities in Afghanistan before the war. To assess the damage caused just by the noise of combat machinery during the war would require extensive research. Briefly, the damage can only be described as substantial and could cause lifetime impairment. There are more important and extremely convincing rationales such as loss of human life and property to avoid the senseless use of war machines. However, with all respect to the importance of this issue, it will be a deviation from the scope and intention of this paper to further speculate on this subject. Noise pollution prevention strategies must be considered during reconstruction of the country in order to ease its adverse effects to urban populations.

The Environment and the War:

The deleterious effect of war on the environment is not a new phenomenon. Historical evidence of the impact of war on the environment can be found in Seistan. Seistan, now a

barren area in southwest Afghanistan, was once a highly productive land with an extensive irrigation system until the irrigation system was destroyed by the Mongols in 13th and 14th centuries. The irrigation system was never repaired. The land became saline and infertile over the years.

Today, the international community and various organizations of the United Nations are particularly concerned with the direct and indirect effects and danger of regional wars on the environment. According to a leading international expert, Paul Shaw, it is not only the direct effects of war that harm the environment, but also the covert and often legitimized actions of countries in securing their national sovereignty are equally devastating (Shaw, 1993).



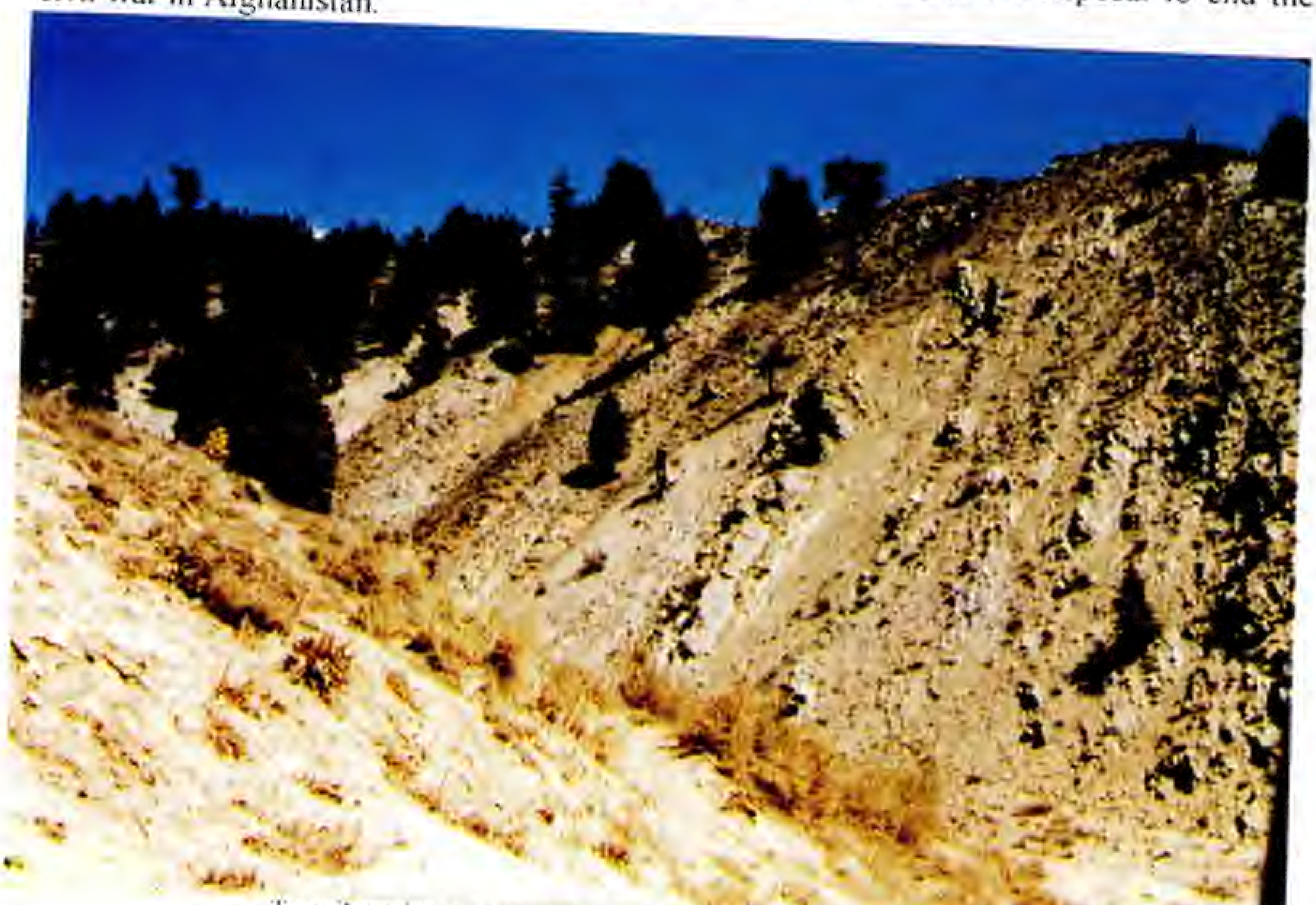
Except for a few major cities, there are no underground fuel stations. Fuel is stored in containers on the ground and siphoned manually into vehicles.

In the 20th century, the intensity of environmental damage resulting from the wars has been remarkably parallel to technological advancement in conventional, chemical, biological, and nuclear warfare. The most thoroughly documented example of deliberate destruction of environment is the Indochina war (Wagner, 1974). The environmental effects of some recent wars such as those in Kuwait and Iraq were more conspicuous and given much publicity. The environmental impact of the war in Afghanistan has not been fully assessed, perhaps partly because of insufficient data and documentation. The cutting of trees and vineyards along both sides of a highway in a valley north of Kabul (Shamali Valley) is an example of intentional destruction of vegetation, a tactic used in Indochina. In some parts of the country, trees that are cut now for construction or fuel bear bullet

holes and metal fragments that stand on the way of the cutting saw. Short-term and long-term environmental effects of indiscriminate use of chemical warfare agents during the Afghan-Soviet war have not been adequately studied. The destruction of the water system, the undiscovered mines scattered across the country, forced urbanization of cities, and the destruction of cultivated and uncultivated lands are a few examples of the impact of the war on Afghanistan's environment.

The continuation of the current civil war in Afghanistan will increase the environmental problems in Afghanistan. These problems often do not recognize boundaries and can become regional or even global. The widespread infectious diseases among the refugees seeking shelter in neighboring countries and abroad will be transmitted to other people in the region and eventually to the world. The destruction of major water dams in Afghanistan will not only cause substantial human, economic, and environmental losses in Afghanistan but also in the neighboring countries.

The human lives lost in this tragic war were undoubtedly the most precious and valuable of all the losses. The loss of human life cannot be undone. However, the environmental losses can be restored to some extent. It would be indecent to pass the responsibility of restoring the environment on to the future generations. Afghanistan is undoubtedly in no financial or technical position to take the task of the environmental restoration alone. The international community as a whole was very generous in many ways in financing this war. It is now the moral obligation of the same community to assist Afghanistan, as much as possible, in restoring environmental losses that occurred during the war. It is equally important that the international community use all the means in it's disposal to end the civil war in Afghanistan.



Topsoil erosion is a common occurrence in deforested areas.

PART III

ENVIRONMENTAL IMPACTS OF FUTURE DEVELOPMENT

Environmental Impacts of Agricultural Development:
In poor countries food is the principle item of consumption and its quantity and quality are a major determinant of the nation's economic welfare and of the health and productivity of its people (Johnston and Kilby, 1975). Afghanistan is a poor country. In addition, at least 80 percent of the population were involved in agriculture and food production before the war. The country reached a fair level of readiness for adapting agricultural advancements just prior to the war. Agricultural extension services were available in most areas and hundreds of students graduated yearly from Agriculture and Veterinary Colleges, Institute of Agriculture, and 14 Agriculture high schools around the country. During the war, the entire agricultural infrastructure was damaged.

At the present time, agricultural production will not even come close to satisfying the domestic needs (see Figure 2 in part II). Only with the application of current science and technology can the country become self-sufficient in the future. Transferable science and technology in the field of agriculture provides the possibility for Afghanistan to bypass the vast investment of time and resources involved in obtaining this knowledge. However, other necessities such as chemical fertilizers, pesticides, and farm equipment are essential to produce efficiently and adequately to meet the present and the future demand. According to one agricultural expert (Azam Gul), 90 percent of the farmers used oxen before the war, and at the present time, the country needs 250,000 pairs of oxen to make up the shortfall (ADA, 1993). It will take decades to reach the pre-war number with natural growth rate. This is only one example of the need for future agricultural mechanization in Afghanistan. The same expert also elaborated on the current devastating effects of pests on agricultural products and the obvious need for the use of pesticides. There is no doubt that the use of chemical fertilizers is essential for crops to reach their production potential and for agricultural development to get underway.

Improper handling and use of land, water, pesticide, and chemical fertilizer can be harmful to the human health and environment. Mishandling and careless maintenance of farm equipment and associated supplies such as fuel and lubricants can also have adverse impact on human health and the environment. Pesticide mishandling can cause acute injuries ranging from minor dermatitis to convulsion and sudden death (Morgan, 1989). Between 1980 to 1986 more than 3,300 persons, mostly agricultural workers, were hospitalized in Costa Rica due to pesticides poisoning and 429 of them died (Wesseling *et al.*, 1993). In 1987, there were 548 incidents of pesticide poisoning in Nicaragua in just two months (McConnell and Hruska, 1993). Pesticides can also contaminate food stuffs causing illnesses ranging from acute poisoning to chronic health problems such as cancer, birth defect, and neurological disorders. Once agricultural development gets underway,

there will be other elements of environmental consideration involving the entire food system including the processing, packaging, transportation, storage and refrigeration.

Livestock production was one of the main contributors to the national economy for items such as wool, red meat, dairy products, and leather products. Livestock, especially small stock such as sheep and goats with the ability to graze closer to the ground, were primarily grazed in rangeland. With the normalization of social life after the war and the subsequent increase in the stockholdings for livelihood, the rangeland can be overburdened without a national livestock and range management plan.

Environmental Impacts of Industrial Development:

Overall development begins with agricultural development. In the early stages of industrialization, the majority of the people are engaged in agriculture. Without alternative resources (mineral, tourism, etc.), production of surplus in agriculture is the key factor for industrialization (Dorner, 1972). With the bountiful underground and mineral resources, Afghanistan has an excellent potential for industrialization as soon as the agriculture sector revitalizes.

There are several products of industrial societies that are known or potential pollutants. Industrial waste or emissions contain certain toxic materials such as mercury, lead, arsenic, cadmium, chromium, and nickel which are released into the environment. These metals are highly toxic to plants, animals, and man and highly resistant, retaining their toxicity for a long time. The chemical, mechanical, and mining industries are the primary sources of metal environmental pollution. Major sources of gaseous emission are industrial operations such as smelter output (smelter production of copper, lead, and zinc), oven coke, iron foundries, and petroleum refineries. They emit carbon dioxide, sulfur oxide, hydrocarbons and nitrogen oxide. Major industrial particulate emissions are from sources such as iron and steel gray iron foundries; grain handling, flour storage, feed milling, cement, pulp and paper, and other industries. About 50 percent of the emission from steel mills are Fe_2O_3. Zinc is released in the form of ZnO from smelters and steel processes. Industrial wastes of petroleum are those such as waste lubricants from industrial and highway use. Phosphorous release into the environment comes from fertilizer, detergents, pesticides, gasoline, lubricating oils, sugar refining, leather tanning, glass, and many other sources. The solid, liquid, and gas fuels used as energy in industrial facilities emit various pollutants to the environment and are the major source of air pollution. (MIT, 1971).

The adverse effects of industrial pollutants are not limited to the industrially advanced countries. These effects have already been observed in developing and less industrialized nations. In Zimbabwe, hospital admission cases of metal poisoning have been recorded and attributed mainly to copper, aluminum, cyanide, and arsenic, and to a lesser extent due to lead, iron, chromium, mercury, and lithium (Kasilo and Nhachi, 1993). Toxic exposure to lead is attributed mainly to exhaust fumes of motor vehicles and lead battery industry. Other industries such as mining, metal refining, paint and glass are identified for toxic

exposure to various metals. Occupational exposure may be the primary source of metal poisoning. However, excessive exposure can occur from drinking contaminated water, eating contaminated food, and from eating and cooking utensils. It should be emphasized that many metal poisoning cases do not reach a hospital at all. Heavy metal (mainly copper, zinc, and lead) environmental pollution concerns have also been raised in Honduras (De Vevey et al., 1993). Reports of lake water, sediment, and fish contamination and eventual human over-exposure are recorded. Industrial discharges were responsible for these types of environmental contaminations. Cadmium exposure has been shown to induce renal damage to battery workers in Sweden (Jarup and Elinder, 1993). In Egypt, 75% of industrial workers exposed to chemicals such as manganese, zinc phosphide, lead, mercury, TNT, and pesticides showed more than one neuropsychiatric symptoms or signs (Amr *et al.*, 1993).

As the industrialization process begins, so does the potential for environmental pollution. The importance of considering environmental consequences of industrialization can be illustrated by comparing the experience of those countries that have had comprehensive environmental programs with those that have had very little. Nations that have had sound environmental policies parallel to the industrial growth have successfully preserved their health and environment while achieving a flourishing economy and astonishing standard of living. In contrast, those with environmental consideration at the bottom of their priorities ended up with an environment that is in shambles and an economy that is paralyzed. Eastern Europe is a classic example of an environment that was sacrificed for industrialization. Some of the damages are irreversible and the burden of repairing what is repairable is far beyond their economical and technological abilities.

Afghanistan will not become industrialized spontaneously. Industrial development is a slow process. Every step in this process must be taken wisely and reasonably to insure the future health and safety of the populace and the environment. Environmental harm does not necessarily have to be the unavoidable consequence of industrialization, technological advances and economical growth. Current technologies provide a wide range of solutions to the recognized problems of the environment (Rath and Herbert-Copley, 1993).

Environmental Impacts of Socioeconomic Development:

Published United Nations data suggest that by 2025 urban population will surpass rural population by a sizable margin in the developing countries (Leonard, 1989). Exploding urbanization and city life, whether forced by the past war or by future socioeconomic development, will exacerbate numerous environmental problems in Afghanistan. The urban population of Afghanistan constituted only 12 percent of the total population before the war (Kurian, 1978). Kabul, a city of less than seven hundred thousand before the war has grown to a city with almost two million people (GRA, 1992). Although the population in Kabul fluctuates due to the recent civil war, under normal conditions it is approximately equal to the urban population of the entire country before the war. Other major cities like Herat, Kandahar, Jalalabad, and Mazar have followed the same pattern of population

expansion. The municipal wastes generated by the expanding population in these cities that lack a sewer system will overload the current primitive waste disposal arrangement, causing further harm to the human health and the environment. The spring flooding of the Kabul river should not remain the only mechanism to flush away the yearly accumulated pollution in the city. The experience of more affluent societies has proven that solid waste is a coherent factor that goes hand in hand with the economical well-being of a community. Without a solid waste management and recycling programs, the wastes could litter the parks, roads, sidewalks, water bodies, open grounds, and buildings around the country. City air quality will degrade from the emission of the growing industries, transit vehicles, and heat generating sources if the mentality about the air quality remains unchanged. Housing redevelopment and land use lacking keen environmental contemplation could create enormous environmental, as well as social, and economical impacts in the future.

Widespread poverty may be the main reason for environmental degradation in rural Afghanistan. Rural population is more dependent on the natural resources. In general, food insecurity and fuel shortages are more common in dry and hilly rural areas of the developing countries like Afghanistan. According to a World Food Council report Afghanistan is among the countries where there is a sharp conflict between food production and rural environmental deterioration (Leonard, 1989). This clearly highlights the importance of integrating economic and environmental considerations in rural development. Sensible use of environmental resources will not only protect the environment but also strengthen the local economy.

Environmental Impacts of International Laws:

The effects of pollution on the world's environment and the major sources of pollution were seriously and scientifically investigated several decades ago (Singer, 1970). It has since been acknowledged that the dilemma involves both the developing and the industrialized countries. The greenhouse effect phenomenon and the depletion of atmospheric ozone are global environmental crises that recognize no national boundaries. The phase-out of ozone-depleting chemicals such as CFCs and methyl bromide would also have substantial economical consequences around the globe. These and other environmental issues have gained momentum over the years and the public concern, mostly of industrialized nations, has intensified.

It was the effects of environmental pollution such as the loss of an estimated 1.25 billion acres of productive land through erosion or salt poisoning that prompted the United Nations to convene a world conference on the Human Environment in Stockholm in 1972 (Simon, 1975). The debate of who should shoulder the burden of repairing or protecting the environment and whether developing countries should receive some compensation for additional costs of environmental controls was intense and bitter. Because developing nations were being asked to pay the costs that the industrialized nations did not bother to pay while they became rich, industrial pollution became the most sensitive issue. The

conflict still exists at the international level, but even more intense with far greater stakes for the developing countries.

The differences of opinion on environmental issues between industrialized and developing countries cannot be easily resolved. The overall environmental and health perceptions between the two are discrete. For example, the health risk concerns from water supplies differ between industrialized and developing countries. This was expressed by the representatives of both industrialized and developing countries at the First International Conference on the Safety of Water Disinfection in August of 1992 in Washington D.C. (ILSI, 1992). The primary concern of many developing nations is microbial risks, and the objective remains the availability of adequate water supplies that are sufficiently disinfected to prevent the spread and devastation of common waterborne diseases. Industrialized nations are concerned with the chemical risks, and the possible long-term health risks posed by disinfectants and disinfecting by-products found in drinking water while they recognize the importance of maintaining disinfection procedures to prevent diseases.

Another example of differences and inconsistencies is the food tolerances for pesticides. The U.S. has food tolerances for 400 chemicals, Japan has tolerances for only 23 pesticides, Taiwan for 64, and South Korea for 31. No microbiological standards are applied in the U.S. but many other countries use such standards (FCN, 1993).

Because some of these inconsistencies cause serious trade barriers and pronounced economical effects in the world, international harmonization and standards are now one of the key issues in global meetings. As a member of the world community, Afghanistan needs to accommodate these international standards to be able to engage in profitable trade. Developing countries like Afghanistan must have adequate environmental scientific and technological capabilities in order to adjust to the international standards and to assess the cause and consequences of its environmental degradation. For Afghanistan, the financial, technical and logistical burden of obtaining them is overwhelming. Considering the economic scales associated with scientific research and the limited resources available to most developing countries, however, some form of collaborative effort in this area is essential. There is a need to have greater participation by developing-country scientists, and policy makers in international institutions than has often been the practice (Rath and Herbert-Copley, 1993).

PART IV

The EFFECTS OF ENVIRONMENTAL PROBLEMS

The Effects of Environmental Problems on National Economy:
Environmental policies and regulations in most part have been influenced by intangibles in considerations of health, safety, wildlife habitats, beauty, and heritage. However, there is a wider acceptance and realization that environmental policies have important economic effects. The importance of economic analysis (cost-benefit) is more evident in environmental policy initiatives of advanced countries such as the United States (Folke and Kaberger, 1991).

The environmental resources of developing countries such as Afghanistan are more vulnerable to harm than those of the industrialized countries. Developing countries are approximately six times more dependent on their natural resources than industrial countries (Speth, 1985). Environmental destruction has become synonymous with poverty wherever poor people cluster together. Environmental problems such as soil erosion, desertification, declining soil fertility, salinization, flooding, mudslidies, fuel wood shortages, and unhealthy water supplies are now one of the most formidable constraints on productivity for rural and urban poor in developing countries. These problems decrease the production potential of the limited land resources that are available in most developing countries such as Afghanistan and reduce the potential and capacity for sustained expansion of agricultural production to meet future needs. These problems also endanger the physical security of people and their meager possessions. Environmental problems also contribute to the increase and spread of opportunistic diseases that in most cases debilitate adults and kill infants.

Governments will have to invest more capital and remedial labor than would otherwise be necessary to rehabilitate, maintain, or increase agricultural production on these lands. The increased investment will have a dramatic impact on the cost of agricultural products in developing countries. The remedial costs and the external social and economic costs for these nations will be going up as long as the environmental problems persist. The incalculable human suffering associated with this process and the destruction of invaluable wildlife and natural resources in the interim can never be recouped.

Afghanistan should begin addressing the issue of economic benefits of various types of environmental improvement and their costs.

A. Technology and the Environment:
Technology has become an important factor in environmental improvement in both developing and advanced countries. In order for the technology assessment and transfer to be successful, a national needs assessment should be undertaken by developing countries. Properly designed country level needs assessment is an essential and effective way of

Recent History:
Because of its geographical situation, Afghanistan has been a country of immense strategic importance in the region. It is a gateway to Indian sub-continent and a major land route to China and Central Asia. Throughout its history, Afghanistan has thus experienced numerous invasion attempts by then super powers. Only in this century, the country was the battle field of two major wars because of the foreign invasions. The invasion of Afghanistan by the British Empire ended in the spring of 1919, as a result of the third and final round of Anglo-Afghan war. The country enjoyed a short period of prosperity following its independence, until an internal turmoil reversed the course. Once the turmoil ended, the country began economical development. The overall growth rate was slow with some sectors of the economy remaining almost status quo. The Soviet invasion of Afghanistan occurred in 1979. The Soviet occupation ended in 1991 after a prolonged and devastating war. The long-lasting Afghan-Soviet war left behind deep scares in almost all segments of life in the country and created an aftermath of uncertain and unsettled times.

Vital Statistics:
The current population of Afghanistan is not accurately known because of the lack of a comprehensive census, but the estimates range between 15 to 20 million (SFC, 1992; Jawad, 1992; GRA, 1992). This figure includes those refugees that are still living in Pakistan and Iran. There were over two million nomads (Kochies) before the war with the tradition of summer grazing in the mountains and winter in the warm lowlands. There is little information available about their status now.

In the 1970s, the population growth rate was 2.0 percent for the whole country and 2.3 percent for the urban areas (Kurian, 1978; Jawad, 1992). The official reports estimated the population growth rate at 1.9 percent during late 1980s and early 1990s (GRA, 1992). The nation's capital city, Kabul, had a population of less than seven hundred thousand in 1978. The population in Kabul increased to almost two million people by the end of the Afghan-Soviet war. The cities of Herat, Kandahar, and Mazar-e-Sharif have also experienced significant population increases. The Kabul population has been fluctuating recently because of the heavy fighting between the warlords. In the 1970s, life expectancy was 39.9 years for men and 40.7 years for women (Kurian, 1978; GRA, 1992).

Afghanistan's work force is estimated at 778,000 persons (GRA 1992). Agriculture is the dominant economic activity estimated at 63 percent of gross domestic products (GDP) and employing over 81 percent of the population (Nyrop 1986). Industry is considered the second dominant activity estimated at 21 percent of GDP and employing 10 percent of the labor force (Nyrop, 1986).

Afghanistan was classified as one of the least developed countries by the United Nations General Assembly. However, pre-war Afghanistan did not suffer from the grinding poverty which characterized some other countries in the subcontinent. The age and gender

transferring data, expertise and analytical capabilities to developing countries (Rath, 1993). Any needs assessment procedure must give careful attention to the methodology to be followed, and the type of training provided to local counterparts. Needs assessment should not be focused exclusively on identifying possible technological solutions. As decades of experience in supporting research for development have shown, a successful intervention must start by identifying the needs of the local population to ensure that solutions are effectively implemented.

Afghanistan should consider having better access to information on the range and performance characteristics of given technologies to choose the right type of technologies for their specific needs. In general terms, environmentally sound technologies are those with the following characteristics:

a. Technologies that reduce the amount of primary energy required for a given use.
b. Technologies to improve the efficiency of energy production.
c. Energy technologies not based on carbon resources.
d. Agricultural and forest-related technologies.

B. Infrastructure and the Environment:

The availability and quality of infrastructure is probably the single most important determinant of the way people in developing countries use their environmental resources. Research has demonstrated that farmers with access to good infrastructure use land more efficiently, adapt modern techniques and inputs more thoroughly, participate more in market economics (selling and buying), and employ more labor than farmers with poor infrastructure. The infrastructure serving high-potential agricultural areas needs to be extended, improved, and rehabilitated.

Research has also indicated that large infrastrutural projects are far too massive to promote the kinds of microbehavioral changes in on-farm management that are needed for long-term success of agroforestry, fuelwood and fodder production, or integrated pest management projects (Leonard, 1989). International organizations concerned with the environment of developing countries must find better ways of supporting multitudes of small projects and working through non-government organizations (NGOs) in order to duplicate small successes. This is especially an important consideration in Afghanistan where the implementation of large scale environmental projects is going to be impossible due to the on-going civil war and considerable weakness of the central government in Kabul. Donors of the NGOs should pay attention to local, on-farm, labor-intensive solutions versus large engineering based solutions to the environmental problems of Afghanistan at the present time.

C. Non-Government Organizations (NGOs) and the Environment:

NGOs have played a fundamental role in raising grass-root awareness, focusing public attention on new problems, sponsoring studies and projects, as well as influencing the

media, the private sector, and the educational process. The NGOs are new to Afghanistan and they have already made significant accomplishments. In many instances the vacuum left by government and political parties has been filled with the existence of these agencies. This role should be extended and encouraged by donors and international organizations. The NGO sponsors should promote more projects that are focused to the environmental problems. It is obvious that the environmental problems in Afghanistan are numerous and the projects should be reactive to those problems, but it is equally important to develop projects with proactive environmental objectives and stop the problems before they occur.



NGOs have played a fundamental role in rural reconstruction and development.

The Effects of Environmental Problems on Social Health:

A. The Effects of Air Pollution on Social Health:

Environmental pollutants can cause acute and chronic illnesses and injuries to humans. Air contaminants can cause variety of illnesses. Air pollutants such as nitrogen oxides, sulfur oxides, ozone, chlorine, formaldehyde, acrolein, and ammonia can cause pulmonary irritation (Waldbott, 1973). Sulfur dioxide and small amounts of trioxide are generated by burning of wood, coal, and petroleum products, mostly for space heating. The man-made sources of nitrogen oxides are wood, coal, oil, natural gas, and motor vehicle fuel combustion. Chlorine has a wide range of uses such as water and sewage treatment, chemicals, pesticides, plastics industries, refrigerants, detergents, bleach, etc. Chlorine was used in World War I as a poisonous gas causing temporary or permanent damage to the

respiratory system in humans. Ammonia is used for production of fertilizers, drugs, explosives, plastics, dyes, and refrigerants.

Air pollutants as dust, such as silica, iron, cobalt, and barium can cause fibrosis (Waldbott, 1973). The level of these dusts that can cause illness is mostly associated with occupational exposure. Metal -fume fever (chest tightness, coughing, fatigue, headache, fever, vomiting, and sometimes blurred vision) is a result of the inhalation of oxides of antimony, arsenic, cadmium, cobalt, copper, iron, lead, magnesium, mercury, and tin, but particularly manganese and zinc.

Asphyxiating pollutants such as carbon monoxide, and hydrogen sulfide deprive the blood from its oxygen carrying ability (Waldbott, 1973). Exposure to high levels is deadly. Carbon monoxide is generated mainly in auto exhaust, smoke, heating with gas and coal, and distillation of coal and wood.

Systemic poisoning can occur due to exposure to atmospheric pollutants such as lead, mercury, fluoride, and cadmium (Waldbott, 1973). Lead gasoline is a primary source of atmospheric lead. Other sources are paints, and industrial products. Lead poisoning can cause gastrointestinal tract, kidneys, heart, and brain damage. Mercury is used in medicine, pesticides (very limited or none at this time), paint and paper. Several mercury poisoning with many fatalities occurred during 1950s and 1960s around the world. These incidents were the result of waste disposal of mercury to water or agricultural uses.

Some air pollutants are carcinogens or can contribute to the development of cancer. Many respiratory irritants contribute to the development of cancer. Air pollutant carcinogens such as polynuclear aromatic hydrocarbons are generated from imperfect combustion of coal, heat generation in steel and coke production, tar, asphalt, and motor vehicle exhaust. Some other organic and inorganic carcinogens are certain pesticides (DDT, Heptachlor, creosote), asbestos, chromate, nickel, arsenic, and cobalt. Some airborne pollutants such as certain pesticides (DDT, 2, 4, 5-T (agent orange) 2,4-D), nitrous oxide, ozone, cadmium, certain types of radiation (X-rays, Gamma rays), and certain natural and man-made radioactive substances can cause gene mutation. Tobacco smoke is composed of numerous pollutants such as carbon monoxide,, nitrogen dioxide, nicotine, and several cancer causing hydrocarbons (Waldbott, 1973).

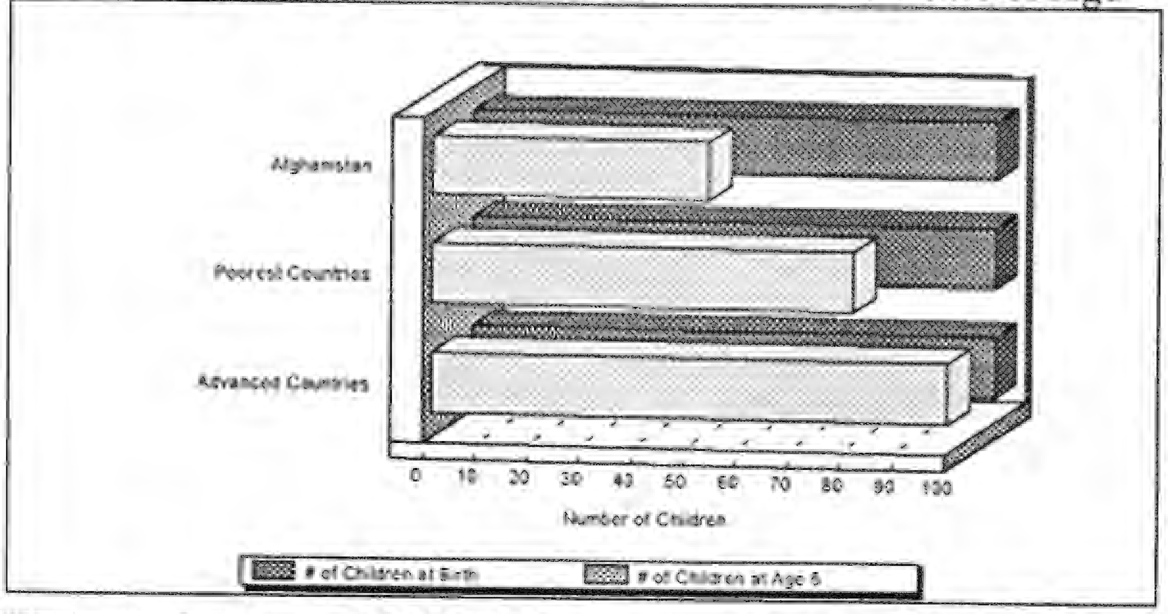
B. The Effects of Water Pollution on Social Health:

Waterborne diseases traceable to poor environmental health conditions account for hundreds of thousand of deaths among the poor people in developing countries each year. However, water supply and sewage has never accounted more than six percent of the World Bank annual lending (Campbell, 1989). At any given time, more than one billion people in developing countries are affected by waterborne diseases, notably cholera, typhoid, dysentery, schistosomiasis, and viral enteric diseases, and each year, more than 5 million people, mostly children, die from diarrheal diseases (ILSI, 1992). Based on 1991 UNICEF data, the mortality rate for children under five years of age in the poorest of

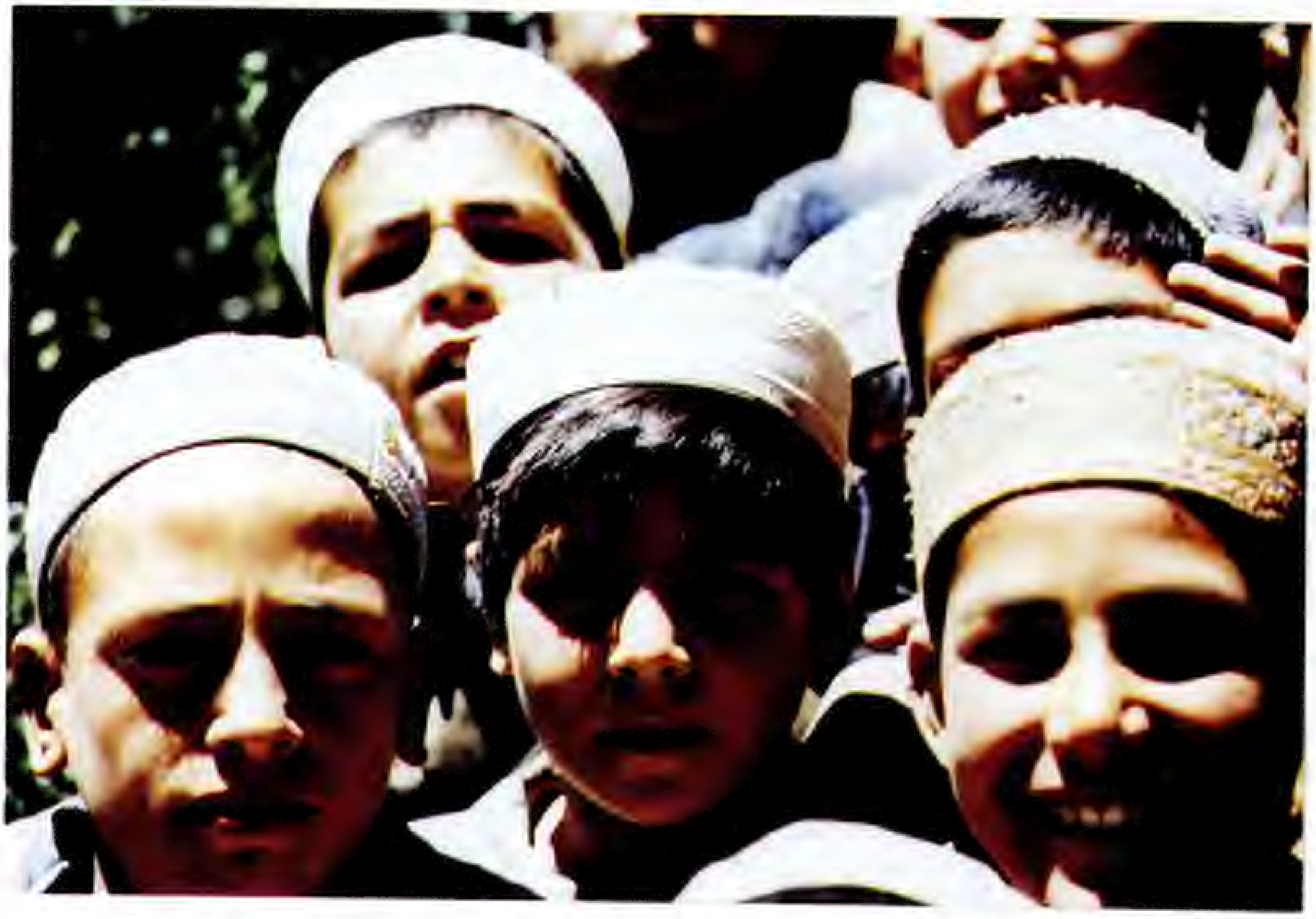
these countries averages 19.3 percent, compared with 1.1 percent in developed countries(ILSI, 1992). In Afghanistan, the mortality rate for children under five years is about 50 percent (SFC, 1992).

Figure 3

Survival Rate for Children Under Five Years of Age



Adopted from SFC, 1992; ILSI, 1992



The survivors.

C. The Effects of Food Contamination on Social Heath:

Food can be contaminated primarily either from microbial or/and chemical sources. Microbial contamination of food originates from poor hygienic practices and improper handling during preparation, preservation, storage, and transportation. Microbial food borne illnesses are similar to waterborne diseases. As the demand for mass production of food increases in the absence of any ordinance, so does the chances for increased food contamination and mass food poisoning. Pesticides are the primary sources of chemical contamination of food stuff. Excessive pesticide in the diet can cause acute and/or chronic human health effects ranging from acute poisoning to chronic health problems such as cancer and birth defect. Pesticides are one of the primary factors in increasing agricultural productivity, and the need for their increased use in Afghanistan has already been discussed. Mismanagement and misuse of pesticides not only impose a risk to the health and safety of the users, but also can impose a risk to the health of general population.

The Effects of Environmental Problems on Biodiversity and Ecosystem:

One reason for the trend towards country-life in industrial societies is to escape the city pollution and to enjoy the fresh air of the countryside. As the cities grow bigger, the ring of the smog becomes wider and the suburbs become further away.

Urban development and random use of land can alter the ecosystem permanently. For example, the use of wetlands such as Kole Hashmat Khan for residential development will destroy that ecosystem permanently and adversely affect its natural habitats. Indiscriminate cutting of forests to satisfy the ever increasing lumber and fuel needs will jeopardize the forests ecosystem and biodiversity. The already bare hills of once lavish and green forests of Paktia and Kunar can be washed off by erosion, causing climatic changes in the region and forcing the associated fauna and vegetation of the area to disappear forever. It must be highlighted that most of the today's food crops and medicinal herbs were obtained from wild species. Mismanagement of pastoral lands can alter the already delicate balance of grazing and rangeland in the country and turn many pastures to barren lands. Continued wholesale hunting of wildlife and altering their habitats will eventually force many species into extinction in the country. It is not exaggerating to say that almost every bird and every predator species in Afghanistan is already an endangered species.

PART V

ECONOMIC ANALYSIS OF ENVIRONMENTAL PROBLEMS

The prolonged war has added a new economic dimension that is affecting every developing and environmental issue in Afghanistan. Sixty percent of the productive capacity of Afghanistan has been directly or indirectly destroyed by war (GRA, 1992). It will cost $644.8 billion to restore the economic losses of capital structures and fixed assets of pre-war Afghanistan (Kamrany, 1990). In short, the war has destroyed most of the physical and social infrastructure of the country and has brought to a screeching halt most productive economic and natural resource based activities. Therefore, Afghanistan's basic physical and social infrastructure needs to be repaired for any large scale environmentally sound economic development to be successful. This will require the development of human resources and socio-economic reform measures. These measures include strengthening and encouragement of entrepreneurial development, introduction of a sound monetary system with the availability of credit specifically in agricultural development, major macro-economic changes in government economic policies, the development and introduction of a large scale reconstruction program, improvement of environmental education, and availability of basic statistics and baseline data for improved planning and research.

Controversy over the use of regulatory commands and market-based incentives has always existed in areas as diverse as economic planning, international trade, and environmental management. While a mixture of regulation and market-based incentives has prevailed in most other areas, except in countries with the command economy, regulatory control has dominated policies and decision-making in environmental management worldwide.

Environmental problems are multi faceted and need a many-sided approach. Western economists seek for the most part a cost benefit analysis approach to environmental problems. Economics in western countries today is largely synonymous with the dominant neoclassical schools. The economists of western countries argue that the weak performance of the regulatory approach and the promising potential of the economic approach have encouraged many countries, including a few in the developing world, to explore more seriously the market-based incentives. Economists also believe that the answers for most environmental problems should be sought in the disassociation between scarcity and price, benefits and costs, rights and responsibilities, actions and consequences. It should be noted that although economic incentive has been useful in raising revenues, it has not been effective in changing behavior (OECD, 1991).

Cost-Benefit Analysis:
Cost-benefit analysis is a methodology where information is gathered and evaluated, resulting in a systematic approach to choose between alternatives. This method has been adopted by many government agencies in order to evaluate specific projects and decide on

their desirability. Much of the environmental degradation is a result of large numbers of individuals engaging in destructive actions which can be privately called rational conduct. For example gathering fuelwood by Afghans in south and southeastern Afghanistan is very normal and considered rational. Or the misuse of land by a temporary tenant who maximizes crop yields without any concern for the conservation of soil is cost effective and profitable decision, but the consequences of both of these actions can be extremely damaging to the forest and the land in question.

In economic analysis of environmental problems, one should keep in mind that the real economy, especially in developing countries, is far removed from the neo classical model (complete and perfectly competitive markets). Therefore, each project and solution needs to be analyzed on its own merit. External factors causes government intervention which in turn often result in policy failure.

Cost-benefit analysis provides two things: clearly established alternatives, and a net-benefits or welfare function, permitting one to quantify the benefits from the various choices. According to Professor Eckstein, one of the leading exponents of the cost-benefit approach, "the resultant absolute benefits of a commodity is equal to the price which the consumer pays." (Dorfman and Dorfman, 1972). Cost-benefit analysis defined as cost methods of environmental economic evaluation has the following components:

1. Identification and quantification of social benefits and costs in terms of a common monetary unit.
2. Identification of the effect that costs and benefits are valued on the basis of individuals willingness to pay for goods and services.
3. Qualitative description of intangibles and comparison with quantified values.
4. Discussion of policy implications.

A well thought and thorough cost-benefit analysis should include any significant effects on income distribution and brought to the attention of decision-makers. It also should look at a variety of available alternatives. Analysis of environmental problems also entails evaluation of cost-benefits which means the application of "social price tags" to environmental impacts.

There are three levels in which economic analysis of environment can be assessed: general policy level, environmental policy level, and project level. The cost-benefit analysis in a project level can be implemented at the pre-project appraisal (planned projects), on-going evaluation (operational project), and post evaluation (completed project) stages.

Alternatives to Cost-Benefit Analysis:
Although the method of cost-benefit analysis within the framework of economic evaluation is feasible and reliable, other alternatives can be presented and considered in assessing environmental problems. Some of these alternatives can be used as a

complement to the cost-benefit analysis. The desirable end product of most cost-benefit analysis is the maximization of social benefits. It is obvious that no efficient market price can exist for public goods. Simulating the market demand price (a price measuring how much consumers would be willing to pay if the good was marketable) can only be applied effectively in a neo classical model of market economy. Therefore, cost-benefit analysis does not relieve policy makers of making value judgments in the evaluation of benefits of public goods particularly in developing countries.



A prototype of a man-made hiding place across Ab-i-Estada-i-Ghazni that accommodates two to three hunters.

PART VI

DISCUSSION AND CONCLUSION

Discussion:
It is apparent that environmental research has not been undertaken and such data on Afghanistan are scarce. The limited amount of information that existed in the country was either lost or destroyed during the war. The limited information in this report suggests, however, that Afghanistan's environmental problems are numerous. There has never been a central organization in the government to oversee environmental issues before or during the war. Before the war, the few existing policies and goals for environmental quality cut across the responsibilities of different ministries, creating lack of coordination and effectiveness. However, the environmental degradation process before the war was at a slower pace, mainly because of the persistent slow rate of development in almost every segment of the economy. Human population was scattered around the country since urbanization was not so appealing. Wetland and wildlife preservation policies were minor but helpful. The most visible and highly publicized programs were the southeast forests protection and management projects.

During the war, the imposed governments were fully occupied with the national resistance and political gains. The environment was not only grossly ignored but also was the victim of intentional and unintentional destruction. The wetlands, and the wildlife and their habitats were severely damaged from direct or indirect effects of war. The absence of forest management and lack of security along with fuel shortages and profiteering during the war subjected the forests around the country to massive cutting and subsequent deforestation. It is feared that deforestation may have reached a non-reversible stage. Most of the agricultural land was left uncultivated and subject to erosion. There was widespread mis-management of pesticides. The country became the largest dump site in the world for some internationally banned pesticides. There are reports (neither confirmed nor denied) of massive radioactive waste disposal in the remote south-western deserts. Human populations clustered in and around urban areas using the land regardless of its environmental values. Livestock grazing concentrated into the close proximity of villages, placing unbearable burden on those pastoral lands. Water systems were destroyed making the environment suitable for spread of infectious diseases. A massive rush of refugees into the major cities created uncontrollable waste disposal, drinking water, air pollution, and personal hygiene problems in these already ill-prepared urban areas.

Conclusion:
The impact of the Afghan-Soviet war and the civil war following Soviet withdrawal on Afghanistan's environment has not been fully assessed. It is imperative that a full assessment of the post-war environment is made. A full assessment of Afghanistan's

environment requires extensive efforts of piece by piece data compilation, surveys, and research that will provide a baseline for identification of the problems and prioritization of restoration projects during the reconstruction phase. The lack of adequate baseline data is a major deficit in design, implementation, and efficiency of environmental protection and restoration projects.

The reconstruction phase has already begun. The dominant role of NGOs is clearly visible in this phase. NGOs have been conducting reconstruction projects with no or minimum level of environmental impact assessment, mainly due to the deficit in expertise and lack of any national environmental standards and guidelines. Except for UNDP, no organizations or agencies involved in reconstruction of Afghanistan have specific environmental screening guidelines or a formal procedure for assessing projects for sound environmental planning and practice (McPherson and Fernando 1991). The traditional economic cost-benefit assessments of the agencies providing the development assistance to developing countries usually ignore environmental and resources considerations (Talbot, 1985). It is important to incorporate environmental risk and benefit into the economic assessments of development projects. Proper environmental assessment of these projects can prevent expensive and wasteful mistakes in the project design and implementation. The creation of national environmental standards and guidelines is a tedious job requiring adequate motive, data, skill, capital, and time. Until such a formulation is in place, these inconsistencies in the environmental impact assessments will continue unless a coordinated effort is implemented.

In-house environmental planning expertise is very limited within individual NGOs. It is feasible to establish a central office (clearing house) with international cooperation to assess and oversee the environmental impacts of all current and proposed development and reconstruction projects. This office should also initiate a comprehensive study to assess the impacts of the recent war on the environment. In addition, it should insure that the reconstruction phase include restoration of environmental resources damaged during the war until a national environmental plan is developed.

The natural resources in Afghanistan are adequate to promote sustainable agricultural, industrial, and socioeconomic development. The experience of advanced and developing countries suggests that environmental pollution and degradation are among the most important side effects of these developments. Their experience also suggests that unless sound preventive measures are taken at the beginning, the consequences are highly expensive in the future and often irreversible.

Environmental harm does not necessarily have to be the unavoidable consequence of industrialization and economic development. Sound environmental considerations must be practiced in future development and reconstruction efforts in the country. Environmental considerations must not stand on the way of economic development in Afghanistan. The goal must be to find practical ways to include environmental consideration in the country's economic development and social life. Therefore, it is imperative that a national environmental action plan (NEAP) is developed for Afghanistan as a long-term strategy. A

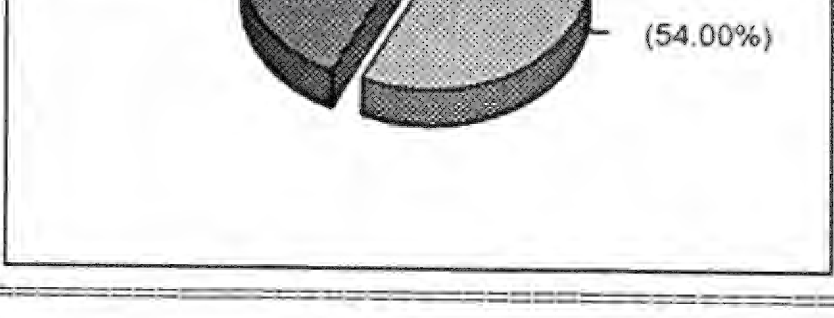
structures in the country following the war (Afghan-Soviet war) is not known. The age structure during 1970s is shown in Figure 1.



Recently, Kochies are more visible along the highways around the country. They avoid traveling off-roads fearing millions of mines still hidden.

Figure 1

Age(year) Structure of the Population During 1970s



After Kurian, 1978.

NEAP would provide a framework for incorporating environmental considerations into the economic planning for sustainable development. It also identifies environmental problems and causes, sets priorities, and specifies the actions necessary. The work should be comprised of the advice of the experts in the country and the experience and financial assistance of others from around the world. Some of the least developed countries such as Madagascar and Lesotho prepared sound NEAP in conjunction with their development plans. A progress report in developing the NEAPs in 18 African countries recommends continuation and strengthening of these plans as a part of overall development plan of each country (Falloux, *et al.*, 1991). It also emphasizes the importance of the international community support in terms of financing, expert advise, and training and participation of public, private, and NGOs in the development and implementation of a NEAP. The world environmental and developmental organizations were very receptive to these plans, devoting considerable financial assistance and expertise in development and implementation of NEAP. As an example, the financial contribution toward Madagascar plan far exceeded the originally estimated one hundred million dollars (UNEP, 1991). The development of a NEAP for a country like Afghanistan, where the availability of environmental data is limited, requires considerable amount of financial and technical support. In light of the growing environmental concerns worldwide, a NEAP for Afghanistan could (and should) receive favorable considerations by the environmental and developmental organizations of the world.

PROPOSALS:

A. Long-Term Goals:

1. Build an environmental data baseline through extensive surveys and research for a full assessment of the post-war environment.

2. Enact environmental legislation for guidance and create an implementing agency within the government for better coordination of the environmental policies.

3. Develop a national environmental action plan (NEAP) as a long-term strategy for integrating sustainable economic growth and environmental concerns.

B. Immediate Goals:

1. Require consistent and sound environmental impact studies, that will include cost-benefit analysis, for all economic and reconstruction projects.

2. Establish a non-government office, consisting of experts, that will function as a one-stop environmental clearing station for all economic and reconstruction projects to:

a) develop and establish environmental guidelines and standards.
b) provide consultation on the draft and review the final environmental impact study at the proposed (planned) project level.
c) oversee and consult on the implementation of the environmental concerns at project operation level.
d) identify research and study areas on the subject of environment.
e) collect, analyze, interpret, and publish baseline data on the environment.

3. Encourage and increase participation of NGO's in projects addressing environmental problems.

4. Initiate projects with proactive environmental objectives to prevent anticipated future environmental problems.

5. Introduce technologies for sustainable agriculture and natural resource management.

6. Promote environmental education and awareness at all levels of the society.

7. Provide monetary grants for research and educational scholarships in economics, statistics, and environment for Afghan scholars and students.

References

AFGHAN DEVELOPMENT ASSOCIATION (ADA) (1993). *Afghan Development Association Report 1991-1992*. ADA, Peshawar, Pakistan.

AFGHAN DEVELOPMENT ASSOCIATION (ADA) (1994). *Afghan Development Association Report 1993*. ADA, Peshawar, Pakistan.

AKBAR, G. R. (1990). The Natural resources "mines" of Afghanistan. *WUFA* 5(1), pp. 12-30.

AMIN, H. and SCHILZ, G.B. (1976). *A Geography of Afghanistan*. Chap. 8. The Center for Afghanistan Studies, Nebraska, USA.

AFGHANISTAN MIRROR (AM) (1991). The unveiling of inhumane acts of the Kabul regime: The communists have turned Afghanistan to a graveyard of radioactive materials. *Afghanistan Mirror*, 3-4(2), pp. 69-70.

AMR, M., ALLAM, M., OSMAAN, A.L., El-BATANOUNI, M., SAMRA, G.E., and HALIM, Z. (1993). Neurobehavioral changes among workers in some chemical industries in Egypt. *Environ. Res.*, 63(2), pp. 295-300.

BOWLBY, S.R. (1978). The geographical background. Pp. 9-36 in *The Archaeology of Afghanistan from Earliest Times to the Timurid Period* (Eds. F.R. ALLCHIN, and N. HAMMOND). Academic Press, New York, USA.

CALLE, E.E., and ZEIGHAMI, E.A. (1985). Health risk assessment of residential wood combustion. Pp. 39-53 in *Indoor Air Quality* (Eds. P.J. WALSH, C.S. DUDNEY, and E.D. COPENHAVER). CRC Press, Inc., Boca Raton, USA.

CAMPBELL, T. (1989). Environmental dilemmas and the urban poor. Pp. 165-187 in *Environment and the Poor: Development Strategies for a Common Agenda* (Eds. H.J. LEONARD). Transaction Books, New Brunswick and Oxford, England.

DE VEVEY, E., BITTON, G., ROSSEL, D., RAMOS, L.D., GUERRERO, L.M., and TARRADELLAS, J. (1993). Concentration and bioavailability of heavy metals in sediments in Lake Yojoa (Honduras). *Bull. Environ. Contam. Toxicol.*, 50, pp. 253-259.

DORFMAN, R. and DORFMAN, N. 1972. *Economics of the Environment, Selected Readings*. Norton, New York, USA.

DORNER, P. (1972). *Land Reform and Economic Development*. Chap. 1. Kingsport Press Inc., Tennessee, USA.

DUDNEY, C.S., and COPNHAVER, E.D. (1985). The elements of indoor air quality. Pp.3-11 in *Indoor Air QualitY* (Eds. P.J. WALSH, C.S. DUDNEY, and E.D. COPENHAVER). CRC Press, Inc., Boca Raton, USA.

DUPREE, L. (1980). *Afghanistan.* Chap. 1. Princeton University Press, New Jersey, USA.

ELMI, S.M.Y. (1986). The impact of the sovietization on Afghan education and culture Pp. 72-125 in *The Sovietization of Afghanistan* (Eds. S.B. MAJROOH, and S.M.Y. ELMI). Printing Cooperation of Frontier Limited, Peshawar, Pakistan.

ESMAIL, M. .and ZURMATI, G.Y. (1991). *Request for Protection and Surveillance of Afghanistan's Forests.* Afghanistan Forest Protection Project, MADERA, Peshawar, Pakistan.

FOLKE, C. and KABERGER, J. 1991. *Linking the Natural Environment and the Economy.* Kluwer Academic Publishers, Boston, USA.

FOOD CHEMICALI NEWS (FCN) (1993). Industry urged to lobby for nationational harmonization. *Food Chemical News,* 35(1), pp. 64.

GLANTZ, S.A. (1985). Health effects of ambient tobacco smoke. Pp.159-172 in *Indoor Air Quality* (Eds. P.J. WALSH, C.S. DUDNEY, and E.D. COPENHAVER). CRC Press, Inc., Boca Raton, USA.

GOVERNMENT OF THE DEMOCRATIC REPUBLIC OF AFGHANISTAN (GDRA) (1987). *National Strategy for Health for All by the Year 2000. Part I: Existing Socio-Economic Situation with Particular Reference to Health,* Pp. 1-9. Ministry of Public Health, The Government of the Republic of Afghanistan (GRA), Kabul, Afghanistan.

GOVERNMENT OF THE REPUBLIC OF AFGHANISTAN (GRA) (1992). *The National Report of the Government of the Republic of Afghanistan for the United Nations Conference on Environment and Development (UNCED) Brazil, 1992.* Ministry of Panning, GRA, Kabul, Afghanistan.

ISLAMIC GOVERNMENT OF AFGHANISTAN (IGA) (1991). *Five-Year Masterplane, Draft for Discussion. Chapter II: Health Problem Discussion.* Pp. 7-11. Ministry of Public Health, The Islamic Government of Afghanistan (IGA), Peshawar, Pakistan.

INTERNATIONAL LIFE SCIENCE INSTITUTE (ILSI) (1992). Chemical and microbial risks of drinking water weighed at ILSI conference. *International Life Sciences Institute (ILSI)* 10(5), pp. 1-3.

JALAL, A. S. (1989) National parks and wildlife of Afghanistan. *WUFA* 4(3-4), pp. 6-15.

JARUP, L., and ELINDER, C.G. (1993). Incidence of renal stones among cadmium exposed battery workers. *British J. Ind. Med.* 50(7), pp. 598-602.

JAWAD, N. (1992). *Afghanistan - A Nation of Minorities*, Manchester Free Press, London, England.

JOHNSTON, B. F. and, KILBY, P. (1975). *Agriculture and Structural Transformation: Economic Strategies in Late-Developing Countries*. Chap.1. Oxford University Press, London, England.

KAMRANY, N.M. (1990). Soviet war liabilities: Measuring economic damages in Afghanistan. *WUFA*, 5(3), pp. 59-88.

KASILO, O.M.J., and NHACHI, C.F.B. (1993). Survey of chemical (mostly metals) poisoning cases as reflected in hospital admissions in urban Zimbabwe. *Bull. Environ. Contam. Toxicol.* 50, pp. 260-265.

KESHAWARZ, M.N. (1991). The history and purposes of water dams in Afghanistan. *Afghanistan Mirror* 2(8), pp. 14-15.

KREISS, K., and HODGSON, M.J. (1985). Building-associated epidemics. Pp. 87-106 in *Indoor Air Quality* (Eds. P.J. WALSH, C.S. DUDNEY, and E.D. COPENHAVER). CRC Press, Inc., Boca Raton, USA.

KRIEGER, L. (1986). The society and its environment. Pp. 75-138 in *Afghanistan a Country Study* (Eds. R.F. NYROP, and D.M. SEEKINS). United States Government Printing Office, Washington, D.C., USA.

KURIAN, G.T. (1978). *Encyclopedia of the Third World, Volume I*. Facts on File, New York, USA.

LEONARD, H.J. (1989). Overview: Environment and the poor. Pp.3-45 in *Environment and the Poor: Development Strategies for a Common Agenda* (Ed. H.J. LEONARD). Transaction Books, New Brunswick and Oxford, England.

MAJROOH, S.B. (1986). Background of the communist coup in Afghanistan and present development. Pp. 24-59 in *The Sovietization of Afghanistan* (Eds. S.B. MAJROOH, and S.M.Y. ELMI). Printing Cooperation of Frontier Limited, Peshawar, Pakistan.

McCONNELL, R., and HRUSKA, A.J. (1993). An epidemic of pesticide poisoning in Nicaragua: Implications for prevention in developing countries. *Am. J. Public Health* 83(11), pp. 1559-1562.

McPHERSON, N. and FERNANDO, B.K. (1991). *Opportunities for Improved Environmental Management in Afghanistan. Report of a Mission under Contract to UNOCA*. The World Conservation Union, Gland, Switzerland.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT) (1971). *Man's Impact on the Global Environment*. Massachusetts Institute of Technology (Sponsored by the). The MIT Press, Massachusetts, USA.

MORGAN, D.P. (1989). *Recognition and Management of Pesticide Poisonings*. United States Environmental Protection Agency, Washington, D.C., USA.

ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT (OECD) (1991). Environmental management in developing countries. OECD Publication and Information Center, Washington, USA.

RAO, Y.S. (1989). Forests of tropical Asia. Pp.3-11 in *Environment and Agriculture* (Ed. Y.S. RAO). World Food Day Symposium, Food and Agriculture Organization of the United Nations, Regional Office for Asia and the Pacific, Bangkok, Thailand.

RATH A. and HERBERT-COPLEY, B. (1993). *Green Technologies for Development, Transfer, Trade and Cooperation*. International Development Research Center, Ottawa, Canada.

SAMIN, A. Q. (1989). War impacts on Afghan agriculture. *WUFA* 4(2), pp. 22-33.

SAN FRANCISCO CHRONICLE (SFC) (1992). San Francisco Chronicle, Monday August 31, 1992

SHAW, R. P. (1993). Warfare, national sovereignty, and the environment. *Environ. Conservation* 20(2).

SIMON, A. (1975). *Bread for the World*. Chap. 5. Paulist Press, New York, USA.

SINGER, S.F. (1970). *Global Effects of Environmental Pollution*. A symposium organized by the American Association for the Advancement of Science. Springer-Verlag New York Inc., New York, USA.

SKOGLAND, T. (1988). Ecology and the war. Pp. 175-195 in *The Tragedy of Afghanistan* (Eds. B. HULDT, E. JANSSON, & C. HELM). Croom Helm, New York, USA.

SPETH, G. (1985). Forward. Pp. I-V in *Helping Developing Countries Help Themselves: Toward a Congressional Agenda for Improved Resource and Environmental Management in the Thrid World* (Ed. L.M. TALBOT). World Resources Institute, A Center for Policy Research, Washington, D.C., USA.

TALBOT, L.M. (1985). Incorporating environment and resources considerations in economic evaluations. Pp. 28-29 in *Helping Developing Countries Help Themselves: Toward a Congressional Agenda for Improved Resource and Environmental Management in the Thrid World* (Ed. L.M. TALBOT). World Resources Institute, A Center for Policy Research, Washington, D.C., USA.

UNITED NATIONS ENVIRONMENT PROGRAM (UNEP) (1991). *The National Environmental Action Plan in Madagascar, from Design to Implementation.* UNEP, AF3/AFTEN, Africa Region.

UNOCA (1991). *Afghanistan, Operation Salam, Programme for 1992.* Office of the Coordination of United Nations Humanitarian and Economic Assistance Programmes Relating to Afghanistan (UNOCA). Geneva, Switzerland.

UNDP (1993a). *Afghanistan Rehabilitation Strategy, Action Plan for Immediate Rehabilitation, Volume II, National and Regional Context.* Kabul, Afghanistan.

UNDP (1993b). *Afghanistan Rehabilitation Strategy, Action Plan for Immediate Rehabilitation, Volume IV, Agriculture and Irrigation.* Kabul, Afghanistan.

UNDP (1993c). *Afghanistan Rehabilitation Strategy, Action Plan for Immediate Rehabilitation, Volume I, Executive Summary.* Kabul, Afghanistan.

WAGNER, R.H. (1974). Indochina: the war against an environment. Pp. 360-374 in *Environment and Man* (Ed. WAGNER, R.H). W.W. Norton & Company, Inc., New York, USA.

WALDBOTT, G.L. (1973). *Health Effects of Environmental Pollutants.* The C.V. Mosby Company, Missouri, USA.

WESSELING, C., CASTILLO, L., and ELINDER, C.G. (1993). Pesticide poisoning in Costa Rica. *Scand. J. Work Environ. Health* 19(4), pp. 227-235.

YUSUFI, M. Q. (1988). Effects of the war on agriculture. Pp. 197-216 in *The Tragedy of Afghanistan* (Eds. B. HULDT, E. JANSSON, & C. HELM). Croom Helm, New York, USA.

Information Sources:
USEPA's Environmental Response Team (ERT) to provide technical assistance national as well as foreign govern. in the area of enviro. emergency issues like chemical spills, hazardous waste spills and hazardous waste sites.

International Development Research Center, Ottawa, Canada

UNESCO, Man and Biosphere publication (provides MAB young scientists reseach grants for 1994).

U.S. Agency for international development of envirnoment, and natural resources management in developing countries.

The environmental and energy study institue (EESI): 1. Indentify and create opportunities for positive action in congress, 2. elevate developing country enviro. issues on the congressional agenda and help them solve them. 3. Build a network of policy makers to meet these challenges.

Overseas Development Council (ODC)
1717 Massachussets Ave. N.W.
Washington, D.C. 20036
Tel: (202) 234-8701
A non-profit, private organization to increase American understanding of economic and social problems of developing countries related to U.S. interests. Functions as a center for policy research and analysis. ODC's work is used by policy makers in executive branch and congress and others in shaping U.S.-third world relations.

World wildlife fund (H. Jeffrey Leonard vice president)

Population in Major Cities		1973 (Kurian, 1978)
Kabul	1,565,400	534,450
Kandahar	237,500	140,024
Herat	186,800	108,750
Mazar-e-Sharif	137,600	60,000
Pul-i-Khumri	38,100	
Jalalabad	71,800	
Kunduz	70,900	

(NRGRA, 1992) before the return of refugees


5 5'94

Education:

Education (including higher education) has been free of charge for Afghans but because of limited resources, not readily available throughout the country. In addition to the government-run schools with salaried teachers, religious figures (mullahs) were responsible for teaching in rural areas. However, the country had one of the lowest literacy rate in the world with only 8 percent of the population literate prior to 1978 (Kurian, 1978). It is suspected that the literacy rate may have declined during the war because of massive migration, lack of security, and loss of human lives. The decline of human resources is more prominent in higher education. Kabul University, University of Polytechnic, and University of Nangarhar were the main centers for higher education. All colleges were affiliated with a university in western Europe or the USA before the war. The University of Polytechnic was affiliated to the former Soviet Union. By 1984, the number of students in higher education had declined from 14,000 to 6,000 (Jawad, 1992). The number of elementary, secondary, and high schools dropped from 1,670 in 1978 to 330 in 1984 (Elmi, 1986). The factional fighting following the Soviet withdrawal and the collapse of the communist regime has brought education system in Kabul to a complete halt.



Environmental awareness needs to be integrated into the education curriculums.

Health:
Prior to the war, there were few modern health facilities such as hospitals and clinics accessible to the population living in rural areas. There were approximately 1,300 doctors in the country just before the war, mostly in urban areas (Jawad, 1992). Extreme malnutrition cases were infrequent, but chronic malnutrition has been a known problem for quite some time, particularly among women and children. Vitamin and mineral deficiencies and anemia have also been common among these two sub-groups. Symptoms of iodine deficiency have been identified in human populations of certain regions. Intestinal worms were common in both adults and children. Infectious diseases such as measles, polio and tuberculosis were also common among the population, but under fairly good control due to the government and various international health organizations' efforts before the war. Cases of malaria were rare before the war. Sanitary water supply was available to 20 percent of the urban population while only 8 percent of the rural population had access to safe drinking water before the war (GDRA, 1987).

Most of the health care facilities were destroyed during the war. Before the war, there were 56 hospitals and 223 basic health clinics in Afghanistan. By 1991, 50 hospitals and 118 clinics were reported destroyed (SFC, 1992). The medical doctors and other health providers fled the country for safety. Primary health care became less available. The country has a 47 percent mortality rate for children under five years old, the highest in the world (SFC, 1992). Those who survive often suffer from indirect effects of war such as malnutrition, crippling diseases, and separation from family members. The systematic destruction of the old irrigation systems has led to stagnant water pools, leading to a sharp increase in malaria incidence in the population (Skogland, 1988). The lack of access to clean water caused the water-borne and infectious diseases to reach epidemic proportions from time to time, contributing to an increase in mortality rate especially among children (IGA, 1991). Although the 1977 declaration of Alma Ata by the World Health Assembly which calls for health for all by the year 2000 has been reviewed by both the deposed communist and the interim governments, the planning and strategies remained on paper, not in practice (GDRA, 1987 and IGA, 1991). Public health expenditure was less than one percent of the GDP or approximately one dollar per person per year during the war (GDRA, 1987).

Economy:
Economic data has always been suspect, scarce, and of dubious reliability. Because of its geography, Afghanistan's main weakness has been the existence of isolated and autonomous agriculture communities. Furthermore, untapped domestic revenue sources, lack of skilled labor force, marginal exploitation of mineral resources, large amounts of uncultivated usable land and dependence on foreign aid have greatly contributed to this weakness (Nyrop, 1986).

In spite of these weaknesses, by 1978 Afghanistan had a solid internal transport infrastructure. Industries such as textiles, cement, and electric power were showing steady

increases in production. There were balance of trade surpluses. The foreign exchange rate grew and the national currency (Afghani) steadily appreciated in value. The economy however, remained dependent on the primitive agricultural sector. In short, Afghanistan achieved a slow but steady rate of growth prior to the communist coup of 1978. The growth declined dramatically after the communist coup and subsequent Soviet invasion.

A. Economic Development Planning:

Development planning was one of the primary mechanisms by which the government directed the economy. Before Mohammad Daoud (Prime Minister, 1953-63) the government's role in the national economy consisted of providing assistance to private sector entrepreneurs and private organizations through effusion of credit and monopoly concessions. Daoud was unsatisfied with the slow growth of the industrial sector, therefore, decided to directly involve the government in the management of the economic affairs of the country. The main element of this state-managed economic system was the introduction of centrally administered development plans. The first Five-Year Development Plan was formally adopted for 1956-61, and two more five-year plans followed. By 1971, after 15 years of state-managed economic system based on development plans, the record was one of only mixed success. The five-year plans had the following shortcomings:

- provided no priorities.
- no cost-benefit analysis.
- no individual project evaluation.
- project schedules were unrealistic.
- cost projections were only rough estimates.
- the ministry of planning could not supervise ongoing projects.
- the government was unable to coordinate projects sponsored by foreign donors.
- shortages of technical manpower forced Afghans to use foreign expertise who were unfamiliar with the Afghan culture and environment.

The state-managed economic system continued under Daoud's presidency after the coup of July 1973. In spite of the concentrated effort and emphasis on industry and infrastructure during the preceding 20 years, agriculture remained the dominant economic sector. Agriculture in the mid-1970s provided adequate food and industrial raw materials so that Afghanistan finally attained food self-sufficiency (Nyrop, 1986).

After 1978, the communist government also sought to undertake development planning as their primary mechanisms to direct the economy. These development plans also were suffering from institutional deficiencies, lack of qualified personnel, lack of statistical information, dependency on foreign advisors, and aid, among other things.

B. Infrastructure:

Afghanistan, being a landlocked country, relies heavily on its roads and air transport system. The majority of transport as well as power generating facilities were built in the decade after World War II. Major highway systems linking the major commercial centers with each other and outside world were built in the 1960's. The total length of roads reached 19,300 km by 1978 of which more than 9,000 km were all-weather roads (GRA 1992). Although major commercial centers were linked by these roads, little attention was paid to secondary and tertiary roads joining the rural areas. This resulted in poor access of these areas to outside markets and government services. Almost all the roads have been heavily damaged and an estimated 2,000 km of asphalt roads totally destroyed (GRA 1992). Afghanistan augmented the road network by building 41 airports for domestic and international travel with foreign aid.

Hayraton is Afghanistan's main river port handling 86 percent of the cargo (Nyrop, 1986). The other major river ports are Shirkhan and Tourghundi. Afghanistan is one of the few countries in the world without a railway system, resulting from the fact that it was never colonized. Due to Afghanistan's difficult terrain, construction of a railroad is very expensive. Prior to Iran's revolution of 1979, Iran had promised to build a railroad linking Kabul with both Iran and Pakistan. This project was projected to cost 1.2 billion U.S. dollars. It collapsed with the revolution in Iran.



Kabul-Kandahar highway (~ 450-km) was one of the best asphalted highways in the country before the war. The degree of the war devastation can be gagged from the remaining of this highway.

Electric power production was 840 kilowatt (kW) hours in 1978 and only five percent of the population all in the main urban centers had access to electricity (Nyrop, 1986). Lack of adequate distribution lines and substations had resulted in high level of energy losses. Furthermore power plants in different parts of Afghanistan are of small and medium size and cannot fulfill the requirements of these regions. Over 457 km of transmission lines (out of a total of 10,474 km) have been totally destroyed during the war (GRA 1992). The telecommunication system is very primitive and underdeveloped. There are only 31,200 telephones and 15,300 main lines. Only Kabul has telex facilities and the capability of handling approximately about 300 lines (GRA, 1992).

C. Labor Force:

Afghanistan like most developing countries has a large pool of unemployed and underdeveloped manpower. Labor force statistics in Afghanistan are inexact and sufficient only to indicate trends. According to a 1975 national demographic survey, out of 5.1 million of the labor force, almost a quarter consisted of nomads and 14 percent composed of women (Nyrop, 1986). Before the Soviet invasion, approximately 80 percent of the population derived their livelihood from agriculture and livestock production. Handicraft was another source of income, employing significant numbers of people in the rural areas. The contribution of women to the economy was more significant than generally perceived. They had an important role in agricultural, livestock, and handicraft production. The government was the largest single employer with approximately 140,000 civil servants (Jawad, 1992).

Afghanistan's economy has always suffered from shortages of technicians, administrators, professionals, and skilled manpower. A lack of security, the institution of compulsory conscription, and the constant harassment of professionals by government exacerbated these shortages after the Soviet invasion.

D. Banking and Monetary Policy:

Due to stringent collateral requirements and poor collection rates, a banking system in Afghanistan was never fully developed. Bank-i-melli was the first bank established in the 1930's followed by the establishment of De Afghanistan Bank in 1939. De Afghanistan Bank later became the largest bank in the country and the center of a formal banking system. This bank had the sole right of currency issue and acted as a lender of interest-free funds to the government and municipalities. It also exercised control over foreign exchange transactions and determined the currencies official exchange rate. Pashtany Tejoraty Bank was subsequently founded in 1954.

After the establishment of the official banking system, the Agricultural Development Bank was founded in 1959 to assist public and private activities in the agrarian sector. There were two other small specialized banks, the Industrial Development Bank and the Mortgage Construction Bank, both established between 1973 and 1976. The banking

Abstract

Afghanistan is a land-locked country located in central Asia. The climate is considered arid. With few exceptions, mean annual precipitation does not exceeds 40 cm. The Soviet invasion of Afghanistan occurred in 1979 and ended in 1991 after a prolonged and devastating war. The long-lasting Afghan-Soviet war destroyed the country's infrastructure and created a political aftermath of uncertain and unsettled times. Despite abundant underground and mineral resources, the country experienced a very slow economic development before the war. The current population estimates range between 15 to 20 million. The country had one of the lowest literacy rate in the world prior to the war and has declined during the war. Most of the educated fled the country during the Soviet occupation and have not returned yet because of the current civil war. Most of the health care facilities were destroyed during the war. The country has the highest mortality rate in the world for children under five years old.

Afghanistan was an agricultural country and often self-sufficient before the war. The war destroyed the whole agricultural infrastructure. Agricultural production declined 70% during the war compared to that of the prewar. An estimated 43,000 hectares of fruit orchards, 3 million units of farm implements, and 3,000 irrigation systems were destroyed or lost as a result of this war. Erosion of fertile top soil resulted in badly degraded agricultural land. The loss of sheep and goats during the war was reported at 9.5 million head. At the present time, despite the lack of a stable central government, there are signs of revitalization of agriculture in some parts of the country. Afghanistan had a much more favorable ratio of stocking density before the war, indicating that the maintenance of pastures was fairly adjusted to the ecological conditions. There are reports of total overgrazing around all the main centers of farming during the war. The reports note that the vegetation was in better shape with the topsoil more intact only within the remote regions of pasture land, but with indications that progressive brush and wood cutting for fire has caused soil erosion in these areas also.

The Paktia, Kunar, and Nooristan areas are the home for the natural forests that mainly consisted of species such as oak, cedar, ash, willow, pine and spruce. The natural nut bearing forests are scattered in the northern and central provinces. As the war began, the existing surveillance eroded and the need for fuel substantially increased. Trees have been cut extensively for fuel for domestic use or sold as lumber for profit. Aerial bombing caused major fires. At the present time, some parts of the forests have already disappeared. Topsoil erosion is clearly visible in deforested areas. The deforestation process has reached the stage where a total loss may be imminent unless urgent and decisive measures are taken to protect the remaining natural forests.

The most important wildlife habitats and wetlands in Afghanistan are the Pamir region, Band-e-Amir lakes, Ghazni marsh land, Dashte Nawar waterfowl, Hamoon-e-Helmand lagoons, Kole Hashmat Khan waterfowl, Ajer Valley, and Darqad region. Most of the wildlife habitats and wetlands of Afghanistan have suffered from the long-lasting war to various extent. Kole Hashmat Khan waterfowl located in the city of Kabul is believed to

have been the most severely damaged during the war, followed by Band-e-Amir. Environmental values may be the least affected in the Pamir region and Hamoon-e-Helmand lagoons due to their relative remoteness. However, one cannot be sure until field visits are made and ecological surveys are performed at all of these sites. The environmental damage to the major recreational parks such as the Paghman Canyon and Estalif Hills, which were the battle fields for countless offensives during the war, is also extensive and require attention.

The major rivers in Afghanistan are Amu to the north, Hari-rud to the west, Helmand to the south and southwest, and Kabul to the east. Rivers, streams, canals, karaizes (underground water system), and springs are used for both domestic and agricultural purposes. Several dams in various sizes are built on the main rivers for water storage and power production. The Kajaki, Arghandab (Dahla), and Naghlu are the largest water storage dams in Afghanistan. Rivers, karaizes, streams, and canals are a vital part of the Afghan agricultural economy and domestic life. The irrigation system was the subject of systematic destruction during the Afghan-Soviet war. The destruction of safe and clean water sources has caused the waterborne diseases such as malaria and diarrheal diseases to reach epidemic proportions, contributing to an increase in morbidity and mortality rates especially among children.

The species of wildlife in Afghanistan are mostly those adapting to arid plains or mountain conditions. Their population has been reduced by hunting and habitat degradation. Most of the predators have been hunted for their furs. There are undocumented reports of increased eagle hunting for smuggling their organs abroad as medicine in exchange for hefty cash. Aquatic avian in Afghanistan are those that migrate seasonally from Siberia to the warmer waters of the Indian sub-continent and Africa. The wetlands are vital for the thousands of ducks, pelicans, gull, crane, flamingo, the Siberian crane and other waterfowl as their nesting places. The management of wildlife before the war was minimal, mainly imposed as declaration of wildlife sanctuaries for royal hunting. The increased fire power during the war coupled with the food and fuel shortage and social displacement in a lawless land placed a heavy toll on wildlife and their habitats.

Air quality was good before the war. Urban outdoor air quality has been deteriorating slowly due to excessive dust and exhaust from a growing number of motor-scooters, other vehicles, and extensive use of coal and wood for heating. Dust is more evident in the air of rural and urban areas now. The smoke generated from cooking and heating is the primary indoor air pollutant, affecting the health of residents, particularly women and children. The other major indoor air pollutant is tobacco smoke which has become more common in Afghanistan. The overcrowding of urban areas during the war substantially increased the existing sanitation problems. The population explosion in the cities coupled with the government ignorance of the sanitation problems and breakdown of the old system brought sanitation to its lowest level. Sanitary water became scarce as the urban population increased, while much of the existing sources of supply were destroyed. There has never been a comprehensive waste disposal or sewage system in the country. Waste and effluents from all industrial operations were dumped directly into the river systems or

discharged onto the open grounds. It is estimated that the city of Kabul alone discharged approximately 15 kilometers of sewer mains and 10,000 cubic meters of untreated waste daily into the Kabul river during recent years. There are also reports of radioactive waste dumping during the war by the former Soviet Union in the southwestern deserts of the country. This could be one of the most serious environmental disasters of the Afghan-Soviet war which requires international inquiry and cooperation. The management and handling of pesticides was totally out of control during the war. The former Soviet Union disposed of their stocks of some internationally banned pesticides into Afghanistan as agricultural aid. As of 1992 there were approximately seven million kilograms of BHC in paper bags stored improperly in various locations in Afghanistan. This amount is probably one of the largest stocks of this banned chemical in the world.

It is apparent that environmental data on Afghanistan are scarce. The limited information in this report suggests, however, that Afghanistan's environmental problems are numerous. The impact of the Afghan-Soviet war and the civil war following Soviet withdrawal on the environment has not been assessed. Therefore, it is imperative to build a baseline data through extensive surveys and research for a full assessment of the environment.

The continuation of the current civil war will increase the environmental problems. These problems often do not recognize boundaries and can become regional or even global. It is important that the international community use all the means in its disposal to end the civil war in Afghanistan. In addition, Afghanistan is undoubtedly in no financial or technical position to take the task of the environmental restoration alone. The international community as a whole was very generous in many ways in financing this war. It is now the moral obligation of the same community to assist Afghanistan, in restoring environmental losses that occurred during the war.

With the bountiful underground resources and solid agriculture background, Afghanistan has an excellent potential for future agricultural and industrial development. As the agricultural and industrial development process begins, so does the potential for environmental pollution. In addition, exploding urbanization and city life, whether forced by the war or by future socioeconomic development, will also exacerbate numerous environmental problems in Afghanistan. The development is a slow process, however, every step in this process must be taken wisely and reasonably to insure the future health and safety of the populace and the environment. It is imperative that a national environmental action plan (NEAP) is developed for Afghanistan as a long-term strategy to find practical ways to include environmental consideration into the country's future economic development plans and social life.

At present time, implementations of large scale development projects are impossible in Afghanistan due to the on-going civil war and weakness of the central government. In many instances this vacuum has been filled with the existence of non-government organizations active in local and small development projects. The NGOs should promote more projects that are focused to the environmental problems. The projects should be not only reactive to current problems, but also proactive to the potential problems. In

addition, the NGOs have been conducting reconstruction and development projects with no or minimum level of environmental impact assessment. In-house environmental planning expertise is very limited within individual NGOs. It is feasible to establish a central office with international cooperation to assess and oversee the environmental impacts of all current and proposed development and reconstruction projects. It is also important to promote environmental education and awareness at all levels of the society particularly within the NGOs, and educational institutions.

AN OVERVIEW AND ASSESSMENT OF AFGHANISTAN'S ENVIRONMENT

By

Tareq A. Formoli, M. Afzal Rashid, and James P. Du Bruille

September 30, 1994



A Scientific Publication of Afghanistan Horizon
Sacramento, California

in Cooperation with

Afghan Development Association (ADA)
Peshawar, Pakistan

PREFACE

The expressed ultimate objective of all current political views in Afghanistan is to lead the country and its people to prosperity. So far, the continuing political struggle has failed in its main objective and overshadowed any efforts towards this goal. The motivated intellectuals are disappointed and discouraged because of this escalating tragedy. Some have focused their entire attention to the current political skirmishes and find any non-political efforts useless. This document is a non-political effort. We trust that the voice of the people of Afghanistan will eventually be the loudest over that of any special interest. We must pay our obligations within our capabilities, regardless of our political beliefs.

This document focuses mainly on Afghanistan's environmental condition. It describes the direct and indirect impacts of the Afghan-Soviet war on Afghanistan's environment. The document demonstrates rationally the environmental prospective of future reconstruction and development. It highlights the importance of environmental resource protection, underlines the adverse impacts of environmental degradation, and encourages environmental education and awareness. It also provides a framework for improving environmental monitoring, developing human resources and action oriented practical research, and most of all, incorporating environmental considerations into the economic and development projects of government, non-government, and international agencies.

The three major conclusions are: First) An environmental assessment following a disaster, a disaster as devastating as Afghan-Soviet war, is essential for the future of the country and must be documented. We believe that the war's direct and indirect damages to the environmental resources of Afghanistan is the second ranking loss following the loss of human resources. Environmental losses resulting from the Afghan-Soviet war have received minimal publicity and attention by Afghans and by the international community. Aside from the apparent environmental damages, the war has affected every segment of the social, economical, and political systems in the country. These effects have had, and will have adverse environmental impacts. This report intends to lay a foundation for a more complete and conclusive environmental assessment of Afghanistan and provide international recognition to the environmental impact of this war.

Second) A centralized and specialized effort is needed to assess the environmental impacts of ongoing and proposed reconstruction projects in Afghanistan until a national environmental standard is developed. Presently, there are no national environmental legislation or guidelines. Historically, environmental protection perception has always been poor and had the least priority in Afghanistan. We fear that this trend will remain unchanged during reconstruction and future development. This ignorance could burden the people of Afghanistan and their children with unbearable cost in the future unless sound environmental precautions are taken now.

Third) Because of a close relationship between the environment and economic development, there is a need to incorporate environmental concerns into economic planning at local, national, and international levels. A national environmental action plan (NEAP) is essential to provide a framework for incorporating environmental considerations into the long-term economic development plans. It also identifies environmental problems, set priorities, and specifies the actions necessary.

Environmental data on Afghanistan are very limited. The information in this document is the compilation of available data in the University of California Library systems, data from ACBAR Resource and Information Center (ARIC) in Peshawar, Pakistan, various organizations of the United Nations particularly United Nations Environment Program (UNEP), and respected publications and periodicals.

Tareq A. Formoli, M.S.
Associate Environmental Research Scientist
California Environmental Protection Agency

M. Afzal Rashid, LLB, M.S.
Associate Governmental Program Analyst
California State Board of Control

James P. Du Bruille, M.S.
Professor
Wenatchee Valley College, Washington.

Acknowledgment

This document is prepared in cooperation with Afghan Development Association (ADA) in Peshawar, Pakistan. ADA is currently the largest Afghan-managed and one of the most successful non-government organization (NGO) that is active in development projects inside Afghanistan. It would have been impossible to prepare this document without the cooperation and assistance of the management and staff of ADA, particularly for arranging our trip to several provinces of Afghanistan and arranging numerous meetings with the staff of several other NGOs in Pakistan.

We are thankful for the excellent academic contribution and advice provided by professor Abdul Wasay Latifi, former professor and Dean of the Faculty of Medicine in Kabul University. We are highly grateful for the keen review and expert advice on literature presentation provided by Dr. Seid Khalil Hashemian, founding editor of Afghanistan Mirror and former professor at the Faculty of Literature in Kabul University. We are also in debt to Nancy Dupree, head of ARIC in Peshawar, for her assistance in literature search for such a topic with scarce and very hard to find information. We admire Mrs. Dupree and her late husband L. Dupree for their sincere dedication to Afghanistan and noble work in Afghanistan studies. Our special thanks go to M.R. Amini of the UNEP Regional Office for Asia and the Pacific in Bangkok, Ian Johnson of Global Environment Facility in Washington, D.C., and L.S. Botero of the FAO Environment and Sustainable Development Coordinating Center in Rome for their prompt responses to our inquiries and for providing copies of unique documents.

We would like to extend our genuine thanks to Ajmal, ADA staff, whose guidance and true Afghan hospitality made our trip to Afghanistan so productive and enjoyable, to Fahim Rahimyar, Library Manager of ARIC, who went beyond the call of duty to assist us in data search, and to many others who helped us in the production of this document.

TABLE OF CONTENTS

PART III
ENVIRONMENTAL IMPACTS OF FUTURE DEVELOPMENT

PART IV
THE EFFECTS OF ENVIRONMENTAL PROBLEMS

PART V
ECONOMIC ANALYSIS OF ENVIRONMENTAL PROBLEMS

PART VI
DISCUSSION AND CONCLUSION